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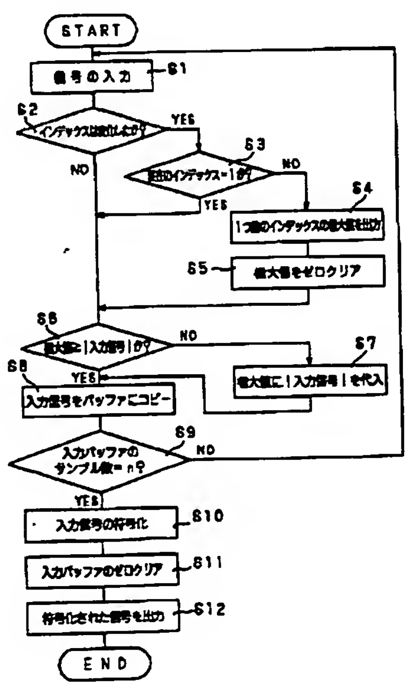
(54)【発明の名称】　信号処理方法及び装置、並びに信号記録媒体

(57)【要約】

【構成】　例えば複数のコンパクトディスクから得られた複数の曲からなる信号（実信号）の記録或いは伝送を行う際に、各曲の信号についての信号レベルの極大値を検出（ステップＳ２～ステップＳ７）し、この極大値を各曲の信号とともに記録或いは伝送する（ステップＳ８～ステップＳ１２）。再生時には、その極大値の最大値と再生する曲の信号の極大値とを比較し、再生する曲の信号の極大値の方が小さい場合には、自動的にその信号のレベルを最大値の信号のレベルと合わせて再生する。

【効果】　使用者は、再生時に各曲ごとの再生レベルの切り替え動作を行う必要がなくなり、したがって、使用者に対してより快適な使用環境を提供することが可能となる。



【特許請求の範囲】

【請求項１】　複数の部分信号からなる実信号の信号処理方法において、
複数の部分信号からなる実信号の各部分信号についての信号レベルの極大値を検出し、
上記実信号とともに各部分信号についての上記極大値を記録或いは伝送することを特徴とする信号処理方法。

【請求項２】　上記部分信号の絶対値の論理和を上記極大値の近似値として用いることを特徴とする請求項１記載の信号処理方法。

【請求項３】　記録或いは伝送される極大値に対して符号化を施すことを特徴とする請求項１又は２記載の信号処理方法。

【請求項４】　請求項１から請求項３のうちのいずれか１項に記載の信号処理方法を用いて処理された信号を記録してなることを特徴とする信号記録媒体。

【請求項５】　複数の部分信号からなる実信号の信号処理方法において、
複数の部分信号からなる実信号の各部分信号についての信号レベルの極大値を検出し、
符号化した実信号とともに各部分信号についての上記極大値を記録或いは伝送することを特徴とする信号処理方法。

【請求項６】　上記部分信号の絶対値の論理和を上記極大値の近似値として用いることを特徴とする請求項５記載の信号処理方法。

【請求項７】　記録或いは伝送される極大値に対して符号化を施すことを特徴とする請求項５又は６記載の信号処理方法。

【請求項８】　請求項５から請求項７のうちのいずれか１項に記載の信号処理方法を用いて処理された信号を記録してなることを特徴とする信号記録媒体。

【請求項９】　請求項１又は２記載の信号処理方法を用いて記録或いは伝送された信号を再生する信号処理方法であって、
記録或いは伝送がなされた複数の部分信号からなる実信号の再生に先立ち、各部分信号についての信号レベルの記録或いは伝送がなされた極大値の中での最大値を検出し、
当該検出した最大値を各部分信号の極大値で除した値を、実信号の再生時に各部分信号ごとに乗ずることを特徴とする信号処理方法。

【請求項１０】　請求項３記載の信号処理方法を用いて記録或いは伝送された信号を再生する信号処理方法であって、
記録或いは伝送がなされた複数の部分信号からなる実信号の再生に先立ち、各部分信号についての信号レベルの記録或いは伝送がなされた符号化された極大値を復号化して、当該復号化した各極大値の中での最大値を検出し、
当該検出した最大値を各部分信号の極大値で除した値を、実信号の再生時に各部分信号ごとに乗ずることを特徴とする信号処理方法。

【請求項１１】　請求項５又は６記載の信号処理方法を用いて記録或いは伝送された信号を再生する信号処理方法であって、
記録或いは伝送がなされた複数の符号化された部分信号からなる実信号の再生に先立ち、各部分信号についての信号レベルの記録或いは伝送がなされた極大値の中での最大値を検出し、
当該検出した最大値を各部分信号の極大値で除した値を、実信号の再生時に復号化した各部分信号ごとに乗ずることを特徴とする信号処理方法。

【請求項１２】　請求項７記載の信号処理方法を用いて記録或いは伝送された信号を再生する信号処理方法であって、
記録或いは伝送がなされた複数の符号化された部分信号からなる実信号の再生に先立ち、各部分信号についての信号レベルの記録或いは伝送がなされた符号化された極大値を復号化して、当該復号化した各極大値の中での最大値を検出し、
当該検出した最大値を各部分信号の極大値で除した値を、実信号の再生時に復号化した各部分信号ごとに乗ずることを特徴とする信号処理方法。

【請求項１３】　上記各部分信号に乗ずる乗数の近似値として、２のべき乗の値を用い、当該乗算としてビットシフトを用いることを特徴とする請求項９から請求項１２のうちのいずれか１項に記載の信号処理方法。

【請求項１４】　複数の部分信号からなる実信号の信号処理装置において、
複数の部分信号からなる実信号の各部分信号についての信号レベルの極大値を検出する検出手段を有し、
上記実信号とともに各部分信号についての上記極大値を記録或いは伝送することを特徴とする信号処理装置。

【請求項１５】　上記部分信号の絶対値の論理和を上記極大値の近似値として用いることを特徴とする請求項１４記載の信号処理装置。

【請求項１６】　記録或いは伝送される極大値に対して符号化を施す符号化手段を設けることを特徴とする請求項１４又は１５記載の信号処理装置。

【請求項１７】　複数の部分信号からなる実信号の信号処理装置において、
複数の部分信号からなる実信号の各部分信号についての信号レベルの極大値を検出する検出手段を有し、
符号化した実信号とともに各部分信号についての上記極大値を記録或いは伝送することを特徴とする信号処理装置。

【請求項１８】　上記部分信号の絶対値の論理和を上記極大値の近似値として用いることを特徴とする請求項１７記載の信号処理装置。

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【請求項１９】　記録或いは伝送される極大値に対して符号化を施す符号化手段を設けることを特徴とする請求項１７又は１８記載の信号処理装置。

【請求項２０】　請求項１又は２記載の信号処理方法を用いて記録或いは伝送された信号を再生する信号処理装置であって、

記録或いは伝送がなされた複数の部分信号からなる実信号の再生に先立ち、各部分信号についての信号レベルの記録或いは伝送がなされた極大値の中での最大値を検出する検出手段と、

当該検出した最大値を各部分信号の極大値で除した値を、実信号の再生時に各部分信号ごとに乗ずる乗算手段とを有してなることを特徴とする信号処理装置。

【請求項２１】　請求項３記載の信号処理方法を用いて記録或いは伝送された信号を再生する信号処理装置であって、

記録或いは伝送がなされた複数の部分信号からなる実信号の再生に先立ち、各部分信号についての信号レベルの記録或いは伝送がなされた符号化された極大値を復号化して、当該復号化した各極大値の中での最大値を検出する検出手段と、

当該検出した最大値を各部分信号の極大値で除した値を、実信号の再生時に各部分信号ごとに乗ずる乗算手段とを有してなることを特徴とする信号処理装置。

【請求項２２】　請求項５又は６記載の信号処理方法を用いて記録或いは伝送された信号を再生する信号処理装置であって、

記録或いは伝送がなされた複数の符号化された部分信号からなる実信号の再生に先立ち、各部分信号についての信号レベルの記録或いは伝送がなされた極大値の中での最大値を検出する検出手段と、

当該検出した最大値を各部分信号の極大値で除した値を、実信号の再生時に復号化した各部分信号ごとに乗ずる乗算手段とを有してなることを特徴とする信号処理装置。

【請求項２３】　請求項７記載の信号処理方法を用いて記録或いは伝送された信号を再生する信号処理装置であって、

記録或いは伝送がなされた複数の符号化された部分信号からなる実信号の再生に先立ち、各部分信号についての信号レベルの記録或いは伝送がなされた符号化された極大値を復号化して、当該復号化した各極大値の中での最大値を検出する検出手段と、

当該検出した最大値を各部分信号の極大値で除した値を、実信号の再生時に復号化した各部分信号ごとに乗ずる乗算手段とを有してなることを特徴とする信号処理装置。

【請求項２４】　上記部分信号に乗ずる乗数の近似値として、２のべき乗の値を用い、当該乗算としてビットシフトを用いることを特徴とする請求項２０から請求項２３のうちのいずれか１項に記載の信号処理装置。

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【請求項２５】　請求項１、２、５、又は６記載の信号処理方法を用いて記録或いは伝送された信号を再生する信号処理装置であって、

記録或いは伝送がなされた複数の部分信号からなる実信号の再生に先立ち、各部分信号についての信号レベルの記録或いは伝送がなされた極大値が供給される制御手段を有し、

当該制御手段は、上記極大値の中での最大値を検出し、各部分信号の極大値及び最大値に応じて、実信号の再生時に各部分信号ごとにアナログ的に再生レベルを制御することを特徴とする信号処理装置。

【請求項２６】　請求項３又は７記載の信号処理方法を用いて記録或いは伝送された信号を再生する信号処理装置であって、

記録或いは伝送がなされた複数の部分信号からなる実信号の再生に先立ち、各部分信号についての信号レベルの記録或いは伝送がなされた符号化された極大値が供給される制御手段を有し、

当該制御手段は、上記極大値を復号化し、当該復号化した各極大値の中での最大値を検出し、各部分信号の極大値及び最大値に応じて、実信号の再生時に各部分信号ごとにアナログ的に再生レベルを制御することを特徴とする信号処理装置。

【請求項２７】　請求項１、２、５、又は６記載の信号処理方法を用いて記録或いは伝送された信号を再生する信号処理装置であって、

記録或いは伝送がなされた複数の部分信号からなる実信号の再生に先立ち、各部分信号についての信号レベルの記録或いは伝送がなされた極大値及び当該各極大値の中での最大値を検出する検出手段と、

上記検出手段の検出出力が供給される制御手段とを有し、

当該制御手段は、各部分信号の極大値及び最大値に応じて、実信号の再生時に各部分信号ごとにアナログ的に再生レベルを制御することを特徴とする信号処理装置。

【請求項２８】　請求項３又は７記載の信号処理方法を用いて記録或いは伝送された信号を再生する信号処理装置であって、

記録或いは伝送がなされた複数の部分信号からなる実信号の再生に先立ち、各部分信号についての信号レベルの記録或いは伝送がなされた符号化された極大値を復号化する復号化手段と、

当該復号化手段の出力から当該各極大値の中での最大値を検出する検出手段と、

上記検出手段の検出出力が供給される制御手段とを有し、

当該制御手段は、各部分信号の極大値及び最大値に応じて、実信号の再生時に各部分信号ごとにアナログ的に再生レベルを制御することを特徴とする信号処理装置。

【発明の詳細な説明】

【0001】

【産業上の利用分野】本発明は、例えば音楽、音声等のディジタル信号を記録及び伝送或いは再生する際の信号処理方法及びその装置、並びに、この信号処理方法で処理された信号が記録される信号記録媒体に関する。

【0002】

【従来の技術】従来より、例えばいわゆるコンパクトディスク（CD）などの記録メディアに対して音楽や音声などの信号を記録（録音）する際には、通常、その録音のレベルは個々に異なっている。すなわち、複数枚のコンパクトディスクでは、各ディスク毎に記録された信号のレベルが異なっていることになる。

【0003】このため、例えば複数枚のコンパクトディスク（CD）などから再生した複数の音楽の曲などを、例えば記録再生が可能な1枚のディスクなどに記録した場合、上述のように各コンパクトディスクから再生された信号のレベルが異なっていたために、当該複数の曲を記録した1枚のディスクを再生する際には、使用者が曲毎に再生レベルを切り替え若しくは制御する必要がある。

【0004】

【発明が解決しようとする課題】すなわち、一般化して述べると、1つの記録媒体の内に記録された音楽や音声、若しくは1つの伝送媒体から伝送された音楽や音声が、いくつかの部分に分かれているとき（例えば曲毎に分かれているとき）、各部分ごとに記録或いは伝送されたレベルが異なっている場合には、その再生の際に各部分毎に再生レベルを切り替える必要がある。

【0005】したがって、使用者は、再生時にレベルの切り替え動作を頻繁に行わなければならず、操作が非常に繁雑になり、当該使用者の負担が増加している。

【0006】そこで、本発明はこの様な実情に鑑みてなされたものであり、複数の部分に分かれて記録或いは伝送された信号を再生する場合でも、使用者は再生レベルの切り替え動作を頻繁に行うことを必要とせず、効果的に再生レベルの切り替えを可能とする信号処理方法及び装置、並びに信号記録媒体を提供することを目的とするものである。

【0007】

【課題を解決するための手段】本発明は、上述の目的を達成するために提案されたものであり、本発明の信号処理方法は、複数の部分信号からなる実信号の信号処理方法であり、各部分信号についての信号レベルの極大値を検出し、上記実信号とともに上記極大値を記録或いは伝送することを特徴とするものである。ここで、記録或いは伝送する実信号や極大値は、符号化したものとすることができ、また、上記部分信号の絶対値の論理和を上記極大値の近似値として用いることができる。

【0008】次に、本発明の信号記録媒体は、上記本発明の信号処理方法によって処理された信号を記録してなるものである。

【0009】さらに、本発明の信号処理方法を用いて処理されて記録或いは伝送された信号を再生する信号処理方法では、上記記録或いは伝送時の信号処理方法に応じて、記録或いは伝送がなされた実信号の再生に先立ち、各部分信号についての信号レベルの記録或いは伝送がなされた極大値の中での最大値を検出し、当該検出した最大値を各部分信号の極大値で除した値を、実信号の再生時に各部分信号ごとに乗ずることを行う。また、記録或いは伝送がなされた極大値が符号化されているときには、実信号の再生に先立ち、上記符号化された極大値を復号化して、当該復号化した各極大値の中での最大値を検出し、その最大値を各部分信号の極大値で除した値を、実信号の再生時に各部分信号ごとに乗ずることを行う。さらに、符号化された実信号の再生に先立ち、各部分信号についての信号レベルの記録或いは伝送がなされた極大値の中での最大値を検出し、当該検出した最大値を各部分信号の極大値で除した値を、実信号の再生時に復号化した各部分信号ごとに乗ずる。またさらに、実信号と極大値が共に符号化されているときは、符号化された実信号の再生に先立ち、部分信号についての信号レベルの記録或いは伝送がなされた符号化された極大値を復号化して、当該復号化した各極大値の中での最大値を検出し、当該検出した最大値を各部分信号の極大値で除した値を、実信号の再生時に復号化した各部分信号ごとに乗ずることを行う。

【0010】さらに、本発明の信号処理方法では、上記各部分信号に乗ずる乗数の近似値として、2のべき乗の値を用い、当該乗算としてビットシフトを用いるようにすることもできる。

【0011】次に、本発明の信号処理装置は、複数の部分信号からなる実信号の信号処理装置であり、実信号の各部分信号についての信号レベルの極大値を検出する検出手段を有し、上記実信号とともに上記極大値を記録或いは伝送することを特徴とするものである。本発明の信号処理装置でも、記録或いは伝送する実信号や極大値は、符号化したものとすることができる。また、上記各部分信号の絶対値の論理和を上記極大値の近似値として用いることができる。

【0012】さらに、本発明の信号処理方法を用いて処理されて記録或いは伝送された信号を再生する信号処理装置は、記録或いは伝送がなされた実信号の再生に先立ち、各部分信号についての信号レベルの記録或いは伝送がなされた極大値の中での最大値を検出する検出手段と、当該検出した最大値を各部分信号の極大値で除した値を、実信号の再生時に各部分信号ごとに乗ずる乗算手段とを有する。こで、記録或いは伝送された極大値が符号化されているときの検出手段は、各部分信号についての信号レベルの符号化された極大値を復号化してからそ

の各極大値の中での最大値を検出する。また、記録或いは伝送された実信号が符号化されているときの乗算手段は、検出手段で検出した最大値を各部分信号の極大値で除した値を、実信号の再生時に復号化した各部分信号ごとに乗ずる。またさらに、実信号と極大値が共に符号化されているときには、検出手段において記録或いは伝送がなされた符号化された極大値を復号化して、当該復号化した各極大値の中での最大値を検出し、乗算手段において当該検出した最大値を各部分信号の極大値で除した値を、実信号の再生時に復号化した各部分信号ごとに乗ずる。

【0013】本発明の信号処理装置においても、上記各部分信号に乗ずる乗数の近似値として、2のべき乗の値を用い、当該乗算としてビットシフトを用いるようにすることができる。

【0014】また、本発明の信号処理方法を用いて処理されて記録或いは伝送された信号を再生する本発明の信号処理装置は、アナログ的に再生レベルを制御することもでき、例えば、記録或いは伝送がなされた実信号の再生に先立ち、各部分信号についての信号レベルの記録或いは伝送がなされた極大値が供給される制御手段を有し、当該制御手段は、上記極大値の中での最大値を検出し、各部分信号の極大値及び最大値に応じて、実信号の再生時に各部分信号ごとにアナログ的に再生レベルを制御する。また、このアナログ的に再生レベルを制御する信号処理装置には、各部分信号についての信号レベルの記録或いは伝送がなされた極大値及び当該各極大値の中での最大値を検出する検出手段を設け、制御手段では上記検出手段で検出された各部分信号の極大値及び最大値に応じて、実信号の再生時に各部分信号ごとにアナログ的に再生レベルを制御することもできる。

【0015】さらに、アナログ的に再生レベルを制御する本発明の信号処理装置において、記録或いは伝送がなされる極大値が符号化されているときには、この符号化された極大値を制御手段に供給し、当該制御手段は、上記極大値を復号化し、当該復号化した各極大値の中での最大値を検出し、各部分信号の極大値及び最大値に応じて、実信号の再生時に各部分信号ごとにアナログ的に再生レベルを制御するものも考えられる。またさらに、符号化された極大値は、制御手段にきょうきやうする前に、復号化手段によって復号化することもでき、さらに検出手段で当該復号化手段の出力から当該各極大値の中での最大値を検出することで、制御手段は、この検出した極大値及び最大値に応じて、実信号の再生時に各部分信号ごとにアナログ的に再生レベルを制御するものとなる。

【0016】

【作用】本発明の信号処理方法及び装置によれば、複数の部分部分信号からなる実信号の記録或いは伝送を行う際に、各部分信号についての信号レベルの極大値を検出し、この極大値を実信号とともに記録或いは伝送しておき、再生時に、その極大値の最大値と、再生する部分信号の極大値とを比較して、再生する部分信号の極大値の方が小さい場合には、自動的にその部分のレベルを最大値の部分信号のレベルと合わせて再生するようにしている。

【0017】また、本発明の信号記録媒体によれば、各部分信号についての信号レベルの極大値をその実信号とともに記録してあるため、再生時のレベル制御にその極大値を用いることができるようになる。

【0018】

【実施例】以下、本発明の好ましい実施例について、図面を参照しながら説明する。

【0019】図1は、本発明の信号処理方法が適用される信号処理装置における信号の記録或いは伝送を行う際の動作説明を示すフローチャートである。この図1のステップＳ２からステップＳ９までが要部の動作の処理工程を表している。

【0020】この図1において、最初のステップＳ１では、音声や音楽の時系列サンプルデータが実信号として入力される。ここでの信号の入力は例えば記録媒体からの読み取ったもの、或いは別の装置からの端子入力などでも良く、当該入力の方法は特に限定せず種々の方法が適用可能である。

【0021】次のステップＳ２では、上記入力された時系列のサンプルデータが全体のうちの何番目の部分に含まれるものかを表すインデックスが、前のサンプルのときと変化したか否かを判定する。なお、このインデックスは、前記コンパクトディスクのＱデータフォーマットのインデックスと同様のものと考えることができ、したがって、上記部分としては例えば音楽の曲などのディジタル信号を例に挙げることができる。また、当該インデックスは、上記時系列サンプルデータの場合と同様に、どのような形で入力されているかの限定は特に行わない。このステップＳ２において、上記インデックスが変化していると判定した場合（イエス）には次のステップＳ３に、また変化していないと判定した場合（ノー）にはステップＳ６に進む。

【0022】ステップＳ３では、現在のインデックスが“１”か否かを判定し、“１”であると判定した場合（イエス）にはステップＳ６に進み、“１”でないと判定した場合（ノー）にはステップＳ４に進む。

【0023】ステップＳ４では、現在の１つ前のインデックスに対応する各サンプルデータすなわち部分信号の極大値を出力し、次のステップＳ５に進む。当該ステップＳ５においては、先に記憶していた極大値をゼロクリアしてステップＳ６に進む。

【0024】次のステップＳ６では、記憶されている極大値を入力サンプルデータの絶対値と比較して、極大値の方が大きいか或いは等しい場合（イエス）にはステッ

プＳ８に進み、逆に極大値の方が小さい場合（ノー）にはステップＳ７に進む。

【００２５】ステップＳ７では、極大値に上記入力サンプルデータの絶対値を代入してステップＳ８に進む。なお、ここで極大値に入力サンプルデータの絶対値を代入する代わりに、入力サンプルデータの絶対値よりは小さくないが近い値である近似値を代入するようにしてもよい。

【００２６】次のステップＳ８では、入力サンプルデータを入力サンプルバッファにコピーして次のステップＳ９に進む。

【００２７】このステップＳ９では、上記入力サンプルバッファに蓄えられたサンプル数が符号化のために予め設定されたサンプル数ｎに対して等しいか否かを判定し、等しいと判定した場合（イエス）には次のステップＳ１０に、等しくないと判定した場合（ノー）にはステップＳ１に戻る。

【００２８】ステップＳ１０では、上記入力サンプルバッファに蓄えられた上記サンプル数ｎの各サンプルデータを用いて符号化を行い、次のステップＳ１１に進む。ここで、上記ｎは符号化の方法によって変わりｎ＝１として１サンプルずつ符号化することにしてもよいし、ｎを複数にしてこの複数のサンプルからなるブロックを符号化することにしてもよく、例えば後述するような圧縮符号化を用いることも可能である。また、ステップＳ１０の符号化を行わず、入力サンプルデータを直接記録或いは伝送することもでき、この場合には、上記ステップＳ８及びステップＳ９を省略するか或いは省略しないならばｎ＝１と考えるようにすればよい。なお、本実施例では、符号化を行う例について述べているが、上述のように符号化を行わないようにすることも考えられ、ここでは符号化の方法及び符号化を行うか否かについて特に限定を行わない。符号化を行わない場合には、後述するステップＳ１２において信号を出力する際に、入力信号すなわち実信号が直接出力されることとなる。

【００２９】上記ステップＳ１０の次のステップＳ１１では、使用された入力サンプルバッファ内のデータを全て０に置き換えて次のステップＳ１２に進む。当該ステップＳ１２においては、符号化された信号を出力し、その後、処理は終了する。なお、このステップＳ１２は、上記ステップＳ８及びステップＳ９を省略した場合には当然省略されることとなる。

【００３０】次に、図２には、本発明の信号処理方法が適用される本発明実施例の信号処理装置において記録或いは伝送を行う際の要部の構成を示す。

【００３１】この図２において、絶対値算出回路２０１は、端子２００より供給された実信号である時系列サンプルデータの絶対値を算出し、この絶対値を上記入力されたサンプルデータと共に極大値設定部２０７の極大値判定回路２０８に送る処理を行う。

【００３２】また、インデックス判定回路２０３には、上記入力されたサンプルデータが全体のうちのどの部分に含まれる信号かを表すインデックスのデータが、端子２０２を介して供給され、当該インデックス判定回路２０３では、当該インデックスが１つ前のインデックスと変わっていれば、そのインデックスを極大値符号化回路２０４に送る処理を行う。

【００３３】当該極大値符号化回路２０４では、上記端子２００からの入力サンプルデータから上記インデックスに対する極大値を検出してその供給された極大値を符号化してこれを出力し、これが極大値出力回路２０５に送られる。なお、この極大値符号化回路２０４における符号化の方法としては、例えば符号として極大値のビット数を用いるもの、或いは入力サンプルデータを符号化する際に使用する正規化係数等の様々なものが考えられるが、ここでは特に限定は行わない。また、当該極大値の符号化は、本発明において必須の条件ではないので、行わないものとしてもよい。前述した図１のフローチャートでは当該符号化を行わない例を示している。

【００３４】次の極大値出力回路２０５では、１つ前のインデックスに対応する各サンプルデータすなわち部分信号の処理によって得られた極大値を端子２１７を介して出力すると共に、極大値を出力した旨を示す識別信号を極大値ゼロクリア回路２０６に送る。

【００３５】当該極大値ゼロクリア回路２０６では、上記識別信号に応じて、極大値の記憶のために使用されているメモリをゼロクリアすると共に、極大値設定部２０７の上記極大値判定回路２０８に対して当該ゼロクリアした旨を示す識別信号を送る。

【００３６】上記極大値判定回路２０８では、１つ前のインデックスに対応する各サンプルデータまでの処理で得られた極大値と前記絶対値算出回路２０１からの絶対値出力とを比較して、上記極大値の方が大きい場合には上記絶対値算出回路２０１から送られた時系列サンプルデータ自身を信号符号化部２１０の入力サンプルバッファ２１１に送る。逆に、今回のサンプルデータの絶対値の方が大きい場合には、上記時系列サンプルデータを上記入力サンプルバッファ２１１に送るだけでなく、当該絶対値を極大値代入回路２０９に送る。

【００３７】当該極大値代入回路２０９では、極大値に割り当てられたメモリに対して、当該入力された絶対値が代入される。

【００３８】上記極大値判定回路２０７及び極大値代入回路２０９は、極大値を設定する極大値設定部２０７を構成するが、これらの処理の代わりに上記絶対値算出回路２０１の絶対値出力の論理和を取ってこの部分信号の極大値の近似値として出力することにしてもよい。

【００３９】次の信号符号化部２１０では、上記入力サンプルバッファ２１１に蓄えられたサンプル数のデータがサンプル数判定回路２１２に送られ、当該サンプル数

判定回路２１２では、符号化の為に予め設定された数ｎだけのサンプルデータが蓄えられているか否かを判定する。このサンプル数判定回路２１２において、上記入力サンプルバッファ２１１に蓄えられたサンプル数が必要なサンプル数ｎに満たないと判定した場合には、その旨を示す識別信号が絶対値算出回路２０１に送られ、これにより新たな入力サンプルについての上述した処理が行われる。また、サンプル数判定回路２１２において、入力サンプルバッファ２１１に必要なサンプル数が蓄えられていたと判定したときには、当該サンプル数判定回路２１２から信号符号化回路２１３に対してその旨を示す識別信号が送られる。

【００４０】当該信号符号化回路２１３では、当該識別信号が供給されると上記入力サンプルバッファ２１１から供給された上記サンプル数ｎのサンプルデータの符号化を行い、当該符号化したサンプルデータを信号出力回路２１５に送り、また、これらの処理が終了するとその旨を示す識別信号をサンプルバッファゼロクリア回路２１４に送る。

【００４１】上記サンプルバッファゼロクリア回路２１４では、上記信号符号化回路２１３からの上記処理の終了を示す識別信号が供給されると、上記入力サンプルバッファ２１１をゼロクリアする。

【００４２】上述の入力サンプルバッファ２１１、サンプル数判定回路２１２、信号符号化回路２１３、及びサンプルバッファゼロクリア回路２１４から信号符号化部２１０が構成されるが、サンプルデータの符号化を行わない場合にはこれらの構成要素は必要がなく、極大値判定回路２０８の出力が直接信号出力回路２１５に送られることとなる。

【００４３】上記信号出力回路２１５では、供給された符号化されたサンプルデータ（符号化を行わないときは当該符号化されていないサンプルデータそのもの）を外部の端子２１６等に出力して処理は終了する。

【００４４】次に、図３は本発明の信号処理装置において、信号の再生を行う際の動作を示すフローチャートである。この図３のステップＳ２１からステップＳ３９までが再生動作の処理工程を示している。

【００４５】この図３において、ステップＳ２１では、初期化として、極大値の最大値及びインデックスを０にセットして、次のステップＳ２２に進む。

【００４６】当該ステップＳ２２では、例えば記録媒体から再生若しくは送信されてきた現在のインデックスの各サンプルデータすなわち部分信号に対応する前記符号化された極大値の入力を行い、次のステップＳ２３に進む。このステップＳ２３では、上記符号化された極大値の復号化を行い、次のステップＳ２４に進む。なお、ここでの符号化及び復号化の方法については、前述した記録或いは伝送の動作の際と同様に特に限定は行わない。また、入力された極大値が符号化されていないデータの場合には上記ステップＳ２３は省略される。

【００４７】ステップＳ２４では、上記復号化された極大値（符号化が行われていない場合は当該符号化されていない極大値そのもの）を、それまでの極大値のうちの最大値と比較し、上記最大値よりも当該復号化された極大値の方が大きい場合（イエス）には次のステップＳ２５に進み、逆に最大値の方が大きい場合（ノー）にはステップＳ２６に進む。

【００４８】上記ステップＳ２５では、上記最大値を、当該復号化した極大値に置き換えて、次のステップＳ２６に進む。当該ステップＳ２６では、全てのインデックスについて上記処理が終了したか否かを判定し、終了していない場合（ノー）にはステップＳ２７で次のインデックスに移った後、ステップＳ２２に戻る。逆に、ステップＳ２６において、全てのインデックスについて上記の処理が終了していると判断した場合（イエス）には、次のステップＳ２８に進む。

【００４９】本実施例の信号処理装置では、以上のステップＳ２１からステップＳ２８において、再生がなされる再生信号（実信号）の全ての部分信号についての極大値の最大値を求めている。

【００５０】次に、ステップＳ２８では、改めて再生のためのインデックスを０にセットして、次のステップＳ２９に進む。このステップＳ２９では、現在のインデックスに対応する部分信号の上記符号化された極大値を入力した後、ステップＳ３０に進む。このステップＳ３０では、当該符号化された極大値を復号化する。なお、前述のように極大値が符号化されて記録或いは伝送されていない場合にはこのステップＳ３０は省略される。

【００５１】次のステップＳ３１では、前記ステップＳ２６で処理が終了した時点で、既に求められていた最大値をステップＳ２９で求められた極大値で割った値ｐを求め、その後ステップＳ３２に進む。

【００５２】ステップＳ３２では、上記符号化され記録或いは伝送されたサンプルデータの入力を行い、ステップＳ３３に進む。このステップＳ３３では、当該入力が復号化に必要なｎサンプル分だけ行われたかどうかを判定し、当該未だｎサンプル分の入力が終了していないと判定した場合（ノー）にはステップＳ３２に戻り、終了したと判定した場合（イエス）には次のステップＳ３４に進む。

【００５３】このステップＳ３４では上記ｎ個のサンプルデータの復号化を行い、次のステップＳ３５に進む。なお、ステップＳ３２からステップＳ３４までは、信号が符号化されて記録或いは伝送されている場合に必要となる工程であるため、信号が符号化されずに入力されたままの形で記録或いは伝送が行われている場合には省略される。

【００５４】次のステップＳ３５では、ステップＳ３４において復号された各サンプルデータにｐを乗じた後、

ステップＳ３６に進む。このステップＳ３６では、上記ステップＳ３５においてｐを乗じたｎ個のサンプルデータを出力してステップＳ３７に進む。

【００５５】このステップＳ３７では、次のサンプルに対応するインデックスの値が変化しているか否かを判定し、変化していないと判定した場合（ノー）にはステップＳ３２に戻って、さらに信号の復号化を続け、変化していたと判定した場合（イエス）にはステップＳ３８に進む。

【００５６】当該ステップＳ３８では、全てのインデックスに対応する部分信号についての上述の処理が終了したか否かを判定し、終了していないと判定した場合（ノー）には次のステップＳ３９に進み、当該ステップＳ３９でインデックスの値を１増加させた後、ステップＳ２９に戻る。一方、ステップＳ３８で処理が終了したと判定した場合（イエス）には信号再生の処理を終了する。

【００５７】次に、図４には本発明の信号処理方法を用いた信号処理装置の上記再生を行う構成を示す。

【００５８】この図４において、最大値設定部２４１の極大値復号化回路２４２では、前記本発明実施例の信号処理装置により検出され記録或いは伝送の際に符号化された極大値が、端子２４０等を介して入力され、ここで全てのインデックスに対応する部分信号についての当該符号化された極大値の復号化がなされ、その後極大値バッファ２４３に送られる。なお、前述のように極大値の記録或いは伝送の際に当該極大値が符号化されていなかった場合には当該極大値復号化回路２４２は省略され、その符号化されていなかった極大値が直接に極大値バッファ２４３に送られることになる。

【００５９】次の最大値検出回路２４４では、上記極大値バッファ２４３に蓄えられた全ての極大値のうちの最大値が検出され、当該最大値が乗数決定回路２４７に送られる。なお、ここでハードウェア規模等の制約がある場合などには、上記最大値を直接求める代わりに、当該最大値の近似値として全ての極大値の論理和を求めてこれに代えるようにしてもよい。

【００６０】次に、上記乗数決定回路２４７においては、端子２４５等を介して入力されたインデックスに対応する極大値バッファ２４３中の該当する極大値によって、上記最大値検出回路２４４から供給れれた最大値を除することにより、当該インデックスに対応する部分信号の各サンプルデータに対する乗数を算出する。なお、ここで当該乗数の近似値として２のべき乗の数を採用して、各サンプルデータに対する乗算を、当該各サンプルデータをビットシフトすることによって実現するようにしてもよい。

【００６１】また、端子２４６には再生された信号（サンプルデータ）が供給され、これが信号復号化部２４８の入力サンプルバッファ２４９に蓄えらる。次のサンプル数判定回路２５０では、上記入力サンプルバッファ２４９に対して復号化のために必要なサンプル数が蓄えられたか否かの判定を行う。当該サンプル数判定回路２５０において上記入力サンプルバッファ２４９に上記復号化に必要なサンプル数が蓄えられていたと判定した場合には、上記入力サンプルバッファ２４９に蓄えられていたサンプルデータが次の信号復号化回路２５１に送られ、ここで復号される。この信号復号化回路２５１の復号化によれ得られた時系列サンプルデータは、時系列サンプル乗算回路２５２に送られる。

【００６２】なお、前述のように信号の符号化が行われていない場合には、上記入力サンプルバッファ２４９、サンプル数判定回路２５０及び信号復号化回路２５１からなる信号復号化部２４８は省略され、端子２４６からの再生入力信号が直接時系列サンプル乗算回路２５２に送られることとなる。また、信号の符号化及び復号化方法についても本実施例は一定数のサンプルずつブロッキングして符号化する場合を例に挙げているが、フィルタ等のような非ブロッキング演算を用いて符号化する方法を採用してもよく、特に限定は行わない。さらに、上記極大値、インデックス、及び入力信号が入力される入力端子等は１つ或いは複数の端子でこれを行うことにしてもよい。

【００６３】時系列サンプル乗算回路２５２においては、上記乗数決定回路２４７からの乗数と、信号復号化回路２５１からの時系列サンプルデータとの乗算を行い、その結果の時系列サンプルデータ（上記乗数が乗算された時系列サンプルデータ）を信号出力回路２５３に出力する。なお、上述のように乗数として２のべき乗が採用されている場合には、上記時系列サンプル乗算回路２５２での乗算を、ビットシフトによって行うようにすることもできる。

【００６４】上記信号出力回路２５３では、上記乗算の行われた時系列サンプルデータを端子２５４等に出力して処理は終了する。

【００６５】次に、上述した図３及び図４においては、ディジタル的に再生信号のゲインのコントロールを行っているが、本発明はアナログ的に同様の処理を行う場合も含む。

【００６６】図５には、本発明の信号処理方法によって再生信号のレベルをアナログ的にコントロールする場合の動作を説明するフローチャートを示す。この図５のステップＳ５１からステップＳ６５までの動作が信号レベルをアナログ的にコントロールする動作の各工程を示している。また、ステップＳ５１からステップＳ６１までは、前記図３のステップＳ２１からステップＳ３１までと同様に、各部分信号についての極大値のうちで最大のものを検出し、各部分信号の極大値で該最大値を除した値を求めるものであるため、ここではその説明を省略する。

【００６７】この図５において、ステップＳ６２では、

前記図３のステップＳ３１同様のステップＳ６１で得られた値に応じて、アナログ的にレベルをコントロールする。この場合、ディジタル的にｐを乗じることと同様の効果をもつようにするため、ディジタル／アナログ（Ｄ／Ａ）変換後のアナログ回路の構成において再生のレベルを調節する処理を行う。

【００６８】なお、ここでステップＳ６２を構成として具体的に実現するには、例えばアンプにおいて信号のアッテネーションを可変抵抗によって制御しているときには上記ｐの値に応じて自動的に可変抵抗の接点を動かすようにするなどの構成が考えられるが、ここでは特に限定は行わない。

【００６９】次のステップＳ６３では、現在再生している部分信号のインデックスが変化しているか否かを判定して、変化していると判定した場合（イエス）には次のステップＳ６４に進む。逆に、当該ステップＳ６３において変化していないと判定した場合（ノー）には同じステップＳ６３に戻り、次にインデックスが変化するまで同様の動作を繰り返す。

【００７０】ステップＳ６４では、全てのインデックスの部分信号についての処理が終了したか否かを判定し、終了していないと判定した場合（ノー）にはステップＳ６５に進む。このステップＳ６５においては、次のインデックスに移って、上記ステップＳ５９からの処理を繰り返す。一方、ステップＳ６４で全てのインデックスの部分信号について処理が終了していると判定した場合（イエス）には、この図５のアナログ的なレベルコントロールの処理を終了する。

【００７１】上述したようなことから、本発明の信号処理方法及び装置においては、記録或いは伝送された複数の部分信号からなる実信号を再生する際に、再生時の使用者による各部分信号毎の再生レベルの切り替え動作を無くし、使用者の負担を軽減しつつ、効果的に再生レベルの切り替えを行うことが可能になる。

【００７２】次に、図６には、上述した本発明の信号処理方法を実現する信号処理装置が適用される一具体例として例えばディジタルオーディオ信号を圧縮符号化して記録媒体に記録し、記録媒体から再生した信号を伸長復号化する圧縮データ記録再生装置の概略構成を示す。

【００７３】この図６において、上述した本実施例の信号処理方法における極大値の設定や再生信号のゲインコントロールなどの制御は中央処理装置（ＣＰＵ）９０にて行われ、また前記極大値符号化回路２０４や信号符号化部２１０での符号化処理は例えばエンコーダ６３において、さらに前記極大値復号化回路２４１や信号復号化部２４８での復号化処理などは例えばデコーダ７３にて行われる。なお、極大値の符号化と復号化については、エンコーダ６３，デコーダ７３ではなく上記ＣＰＵ９０において行うようにすることもできる。さらに、前記時系列サンプル乗算回路２５２に対応する前記ディジタル的なゲインコントロール（ゲイン調節）は乗算回路７８において、アナログ的なゲインコントロール（ゲイン調節）はレベル調節回路７７において行われる。

【００７４】この図６に示す圧縮データ記録再生装置９において、先ず記録媒体としては、スピンドルモータ５１により回転駆動される光磁気ディスク１が用いられる。なお、この光磁気ディスク１には、例えば直径が６４ｍｍの光磁気ディスクとして総称されるいわゆるミニディスク（ＭＤ）などを使用することができる。この光磁気ディスク１に対するデータの記録時には、例えば光学ヘッド５３によりレーザ光を照射した状態で記録データに応じた変調磁界を磁気ヘッド５４により印加することによって、いわゆる磁界変調記録を行い、光磁気ディスク１の記録トラックに沿ってデータを記録する。また再生時には、上記光磁気ディススク１の記録トラックを光学ヘッド５３によりレーザ光でトレースして磁気光学的に再生を行う。

【００７５】光学ヘッド５３は、例えば、レーザダイオード等のレーザ光源、コリメータレンズ、対物レンズ、偏光ビームスプリッタ、シリンドリカルレンズ等の光学部品及び所定パターンの受光部を有するフォトディテクタ等から構成されている。この光学ヘッド５３は、光磁気ディスク１を介して上記磁気ヘッド５４と対向する位置に設けられている。光磁気ディスク１にデータを記録するときには、後述する記録系のヘッド駆動回路６６により磁気ヘッド５４を駆動して記録データに応じた変調磁界を印加すると共に、光学ヘッド５３により光磁気ディスク１の目的トラックにレーザ光を照射することによって、磁界変調方式により熱磁気記録を行う。またこの光学ヘッド５３は、目的トラックに照射したレーザ光の反射光を検出し、例えばいわゆる非点収差法によりフォーカスエラーを検出し、例えばいわゆるプッシュプル法によりトラッキングエラーを検出する。光磁気ディスク１からデータを再生するとき、光学ヘッド５３は上記フォーカスエラーやトラッキングエラーを検出すると同時に、レーザ光の目的トラックからの反射光の偏光角（カー回転角）の違いを検出して再生信号を生成する。

【００７６】光学ヘッド５３の出力は、ＲＦ回路５５に供給される。このＲＦ回路５５は、光学ヘッド５３の出力から上記フォーカスエラー信号やトラッキングエラー信号を抽出してサーボ制御回路５６に供給するとともに、再生信号を２値化して後述する再生系のデコーダ７１に供給する。

【００７７】サーボ制御回路５６は、例えばフォーカスサーボ制御回路やトラッキングサーボ制御回路、スピンドルモータサーボ制御回路、スレッドサーボ制御回路等から構成される。上記フォーカスサーボ制御回路は、上記フォーカスエラー信号がゼロになるように、光学ヘッド５３の光学系のフォーカス制御を行う。また上記トラッキングサーボ制御回路は、上記トラッキングエラー信

号がゼロになるように光学ヘッド５３の光学系のトラッキング制御を行う。さらに上記スピンドルモータサーボ制御回路は、光磁気ディスク１を所定の回転速度（例えば一定線速度）で回転駆動するようにスピンドルモータ５１を制御する。また、上記スレッドサーボ制御回路は、システムコントローラ５７により指定される光磁気ディスク１の目的トラック位置に光学ヘッド５３及び磁気ヘッド５４を移動させる。このような各種制御動作を行うサーボ制御回路５６は、該サーボ制御回路５６により制御される各部の動作状態を示す情報をシステムコントローラ５７に送る。

【００７８】システムコントローラ５７には、キー入力操作部５８や表示部５９が接続されている。このシステムコントローラ５７は、キー入力操作部５８による操作入力情報により指定される動作モードで記録系及び再生系の制御を行う。またシステムコントローラ７は、光磁気ディスク１の記録トラックからヘッダータイムやサブコードのＱデータ等により再生されるセクタ単位のアドレス情報に基づいて、光学ヘッド５３及び磁気ヘッド５４がトレースしている上記記録トラック上の記録位置や再生位置を管理する。さらにシステムコントローラ５７は、データ圧縮率と上記記録トラック上の再生位置情報とに基づいて表示部５９に再生時間を表示させる制御を行う。なお、当該システムコントローラ５７が前記ＣＰＵ９０での処理を行うようにすることもでき、この場合は前記ＣＰＵ９０は設ける必要がない。

【００７９】上記再生時間表示は、光磁気ディスク１の記録トラックからいわゆるヘッダータイムやいわゆるサブコードＱデータ等により再生されるセクタ単位のアドレス情報（絶対時間情報）に対し、データ圧縮率の逆数（例えば１／４圧縮のときには４）を乗算することにより、実際の時間情報を求め、これを表示部５９に表示させるものである。なお、記録時においても、例えば光磁気ディスク等の記録トラックに予め絶対時間情報が記録されている（プリフォーマットされている）場合に、このプリフォーマットされた絶対時間情報を読み取ってデータ圧縮率の逆数を乗算することにより、現在位置を実際の記録時間で表示させることも可能である。

【００８０】次に、このディスク記録再生装置の記録再生機の記録系において、入力端子６０からのアナログオーディオ入力信号ＡINは、ローパスフィルタ６１を介してＡ／Ｄ変換器６２に供給される。このＡ／Ｄ変換器６２は、上記アナログオーディオ入力信号ＡINを量子化する。Ａ／Ｄ変換器６２から得られたディジタルオーディオ信号は、ＡＴＣ（Adaptive Transform Coding ）ＰＣＭエンコーダ６３に供給される。また、上記Ａ／Ｄ変換器６２のディジタルオーディオ信号は、前記ＣＰＵ９０にも送られる。このときのＣＰＵ９０は、当該ディジタルオーディオ信号から前記インデックスを生成して上記ＡＴＣエンコーダ６３に送る。

【００８１】一方、入力端子６７には、例えば他の本記録再生装置からの少なくともインデックスを含むディジタルオーディオ入力信号ＤINが供給され、この入力信号ＤINがディジタル入力インターフェース回路６８を介してＡＴＣエンコーダ６３及び上記ＣＰＵ９０に供給される。このときの当該ＣＰＵ９０は、上記インデックス及びディジタルオーディオ信号を用いて前述した本発明の記録時の信号処理方法に対応する極大値の設定などの処理を行い、得られたデータを上記ＡＴＣエンコーダ６３に送る。

【００８２】エンコーダ６３は、上記入力信号ＡINを上記Ａ／Ｄ変換器６２により量子化した所定転送速度のディジタルオーディオＰＣＭデータやディジタル入力インタフェース回路６８を介して供給された時系列サンプルデータに対して、ビット圧縮（データ圧縮）処理を行うと共に、前記極大値の符号化をも行い、これらをメモリ６４に送る。なお、上記エンコーダ６３でのデータ圧縮においては、当該圧縮率を４倍として説明するが、本実施例はこの倍率には依存しない構成となっており、応用例により任意に選択が可能である。

【００８３】次に、メモリ６４は、データの書き込み及び読み出しがシステムコントローラ５７により制御され、ＡＴＣエンコーダ６３から供給されるＡＴＣデータを一時的に記憶しておき、必要に応じてディスク上に記録するためのバッファメモリとして用いられている。すなわち、例えばＡＴＣエンコーダ６３によって高能率符号化がなされた圧縮オーディオデータは、そのデータ転送速度が、標準的なＣＤ－ＤＡフォーマットのデータ転送速度（７５セクタ／秒）の１／４、すなわち１８．７５セクタ／秒に低減されており、この圧縮データがメモリ１４に連続的に書き込まれる。この圧縮データ（ＡＴＣデータ）は、前述したように４倍に圧縮されていのときには４セクタにつき１セクタの記録を行えば足りるが、このような４セクタおきの記録は事実上不可能に近いため、後述するようなセクタ連続の記録を行うようにしている。この記録は、休止期間を介して、所定の複数セクタ（例えば３２セクタ＋数セクタ）から成るクラスタを記録単位として、標準的なＣＤ－ＤＡフォーマットと同じデータ転送速度（７５セクタ／秒）でバースト的に行われる。すなわち、当該メモリ１４においては、上記ビット圧縮レートに応じた１８．７５（＝７５／4）セクタ／秒の低い転送速度で連続的に書き込まれたＡＴＣオーディオデータが、記録データとして上記７５セクタ／秒の転送速度でバースト的に読み出される。この読み出されて記録されるデータについて、記録休止期間を含む全体的なデータ転送速度は、上記１８．７５セクタ／秒の低い速度となっているが、バースト的に行われる記録動作の時間内での瞬時的なデータ転送速度は上記標準的な７５セクタ／秒となっている。従って、ディスク回転速度が標準的なＣＤ－ＤＡフォーマットと同じ速度

（一定線速度）のとき、年甲斐CD－DAフォーマットと同じ記録密度、記憶パターンの記録が行われることになる。
【0084】上記メモリ64から上記75セクタ／秒の（瞬時的な）転送速度でバースト的に読み出されたATCオーディオデータ等すなわち記録データは、エンコーダ65に供給される。ここで、上記メモリ64からエンコーダ65に供給されるデータ列において、1回の記録で連続記録される単位は、複数セクタ（例えば32セクタ）から成るクラスタ及び該クラスタの前後位置に配されたクラスタ接続用の数セクタとしている。このクラスタ接続用セクタは、エンコーダ65でのインターリーブ長より長く設定しており、インターリーブされても他のクラスタのデータに影響を与えないようにしている。
【0085】エンコーダ65は、メモリ64から上述したようにバースト的に供給される記録データについて、エラー訂正のための符号化処理（パリティ付加及びインターリーブ処理）やEFM符号化処理などを施す。このエンコーダ65による符号化処理の施された記録データが磁気ヘッド駆動回路66に供給される。この磁気ヘッド駆動回路66は、磁気ヘッド54が接続されており、上記記録データに応じた変調磁界を光磁気ディスク1に印加するように磁気ヘッド54を駆動する。
【0086】また、システムコントローラ57は、メモリ64に対する上述の如きメモリ制御を行うとともに、このメモリ制御によりメモリ64からバースト的に読み出される上記記録データを光磁気ディスク1の記録トラックに連続的に記録するように記録位置の制御を行う。この記録位置の制御は、システムコントローラ57によりメモリ64からバースト的に読み出される上記記録データの記録位置を管理して、光磁気ディスク1の記録トラック上の記録位置を指定する制御信号をサーボ制御回路56に供給することによって行われる。
【0087】次に、この光磁気ディスク記録再生ユニットの再生系について説明する。この再生系は、上述の記録系により光磁気ディスク1の記録トラック上に連続的に記録された記録データを再生するためのものであり、光学ヘッド53によって光磁気ディスク1の記録トラックをレーザ光でトレースすることにより得られる再生出力がRF回路55により2値化されて供給されるデコーダ71を備えている。この時、光磁気ディスクのみではなく、いわゆるコンパクトディクス（CD：Compact Disc）と同様な再生専用光ディスクの読み出しも行なうことができる。
【0088】デコーダ71は、上述の記録系におけるエンコーダ65に対応するものであって、RF回路55により2値化された再生出力について、エラー訂正のための上述の如き復号化処理やEFM復号化処理などの処理を行いオーディオデータ等を、正規の転送速度よりも早い75セクタ／秒の転送速度で再生する。このデコーダ71により得られる再生データは、メモリ72に供給される。
【0089】メモリ72は、データの書き込み及び読み出しがシステムコントローラ57により制御され、デコーダ71から75セクタ／秒の転送速度で供給される再生データがその75セクタ／秒の転送速度でバースト的に書き込まれる。また、このメモリ72は、上記75セクタ／秒の転送速度でバースト的に書き込まれた上記再生データが正規の75セクタ／秒の転送速度18．75セクタ／秒で連続的に読み出される。
【0090】システムコントローラ57は、再生データをメモリ72に75セクタ／秒の転送速度で書き込むとともに、メモリ72から上記再生データを上記18．75セクタ／秒の転送速度で連続的に読み出すようなメモリ制御を行う。また、システムコントローラ57は、メモリ72に対する上述の如きメモリ制御を行うとともに、このメモリ制御によりメモリ72からバースト的に書き込まれる上記再生データを光磁気ディスク1の記録トラックから連続的に再生するように再生位置の制御を行う。この再生位置の制御は、システムコントローラ57によりメモリ72からバースト的に読み出される上記再生データの再生位置を管理して、光磁気ディスク1もしくは光ディスク1の記録トラック上の再生位置を指定する制御信号をサーボ制御回路56に供給することによって行われる。
【0091】上記メモリ72から18．75セクタ／秒の転送速度で連続的に読み出された再生データとして得られるATCオーディオデータは、ATCデコーダ73に供給される。このATCデコーダ73は、オーディオのATCデータを4倍にデータ伸張（ビット伸張）することで16ビットのディジタルオーディオデータを再生すると共に、前記符号化された極大値の復号化をも行う。このATCデコーダ73からのディジタルオーディオデータは、乗算回路78を介してD／A変換器74に送られると共に、前記CPU90にも送られ、さらに、このCPU90には上記極大値及びインデックスのデータも送られる。
【0092】このときのCPU90は、上記インデックス，極大値及びディジタルオーディオデータを用いて前述した本発明の再生時の信号処理方法に対応する乗数決定等の処理を行い、得られたデータを乗算回路78やレベル調節回路77に送る。すなわち、再生信号に対するゲインコントロールをディジタル的に行う場合には上記乗算回路78に乗数を、またアナログ的に行う場合にはレベル調節回路77に可変抵抗の制御信号を送る。
【0093】ここで、ディジタル的にゲインコントロールを行う場合には、上記乗算回路78にて上記CPU90からの乗数が乗算され、このディジタル的にゲインコントロールが施されたディジタルデータがD／A変換器74に送られる。このD／A変換器74は、ATCデコ

ーダ７３から供給されるディジタルオーディオデータをアナログ信号に変換する。このＤ／Ａ変換器７４の出力は、ローパスフィルタ７５を介してレベル調節回路７７をそのまま通過し、ディジタル的にゲインコントロールが施されたアナログオーデイオ信号AOUT として出力端子７６から出力される。なお、このディジタル的なゲインコントロールのみを行う構成では、レベル調節回路７７は不要となる。また、上記乗算回路７８の出力は、ディジタル出力インタフェース回路７９を介し、ディジタルオーディオ出力信号DOUT として端子８０から出力することもできる。

【００９４】また、アナログ的にゲインコントロールを行う場合には、上記乗算回路７８は設けられずに上記ＡＴＣデコーダ７３からのディジタルオーディオデータが直接Ｄ／Ａ変換器７４に送られるか、又は乗算回路７８が設けられているならば上記ＡＴＣデコーダ７３からのディジタルオーディオデータに対して乗数として１が乗算されてから、Ｄ／Ａ変換器７４に送られる。このＤ／Ａ変換器７４からのアナログ信号は、ローパスフィルタ７５を介してレベル調節回路７７に送られ、当該レベル調節回路７７において前記ＣＰＵ９０からの制御信号に基づいてゲインコントロールが施された後、アナログオーデイオ信号AOUT として出力端子７６から出力される。

【００９５】

【発明の効果】上述したように、本発明の信号処理方法及び装置によれば、複数の部分信号からなる実信号の記録或いは伝送を行う際に、各部分部分についての信号レベルの極大値を検出し、この極大値を実信号とともに記録或いは伝送しておき、再生時にその極大値の最大値と、再生する部分信号の極大値とを比較して、再生する部分信号の極大値の方が小さい場合には、自動的にその部分信号のレベルを最大値の部分信号のレベルと合わせて再生するようにしているため、使用者は、各部分信号ごとの再生レベルの切り替え動作を行う必要がなく、したがって、使用者の負担を軽減しつつ、効果的に再生レベルの切り替えが可能になる。これにより、本発明の信号処理方法及び装置によれば、使用者に対して、より快適な使用環境を提供することが可能となる。

【００９６】また、本発明の信号記録媒体によれば、各部分信号についての信号レベルの極大値を実信号とともに記録してあるため、再生時のレベル制御にその極大値を用いることができ、したがって、使用者は、この信号記録媒体の再生時に、各部分信号ごとの再生レベルの切り替え動作が必要なく、使用者の負担を軽減しつつ、効果的に再生レベルの切り替えを行うことが可能になる。

【図面の簡単な説明】

【図１】本発明の信号処理方法により信号の記録或いは伝送を行う際の動作の概略を表すフローチャートである。

【図２】本発明信号処理方法により信号の記録或いは伝送を行う本発明実施例の信号処理装置の要部の構成を示すブロック回路図である。

【図３】本発明信号処理方法により信号の再生を行う際の動作の概略を表し、特にディジタル的に再生レベルのコントロールを行う場合の動作の流れを表すフローチャートである。

【図４】本発明信号処理方法により信号の再生を行う本発明実施例の信号処理装置の要部の構成を示すブロック回路図である。

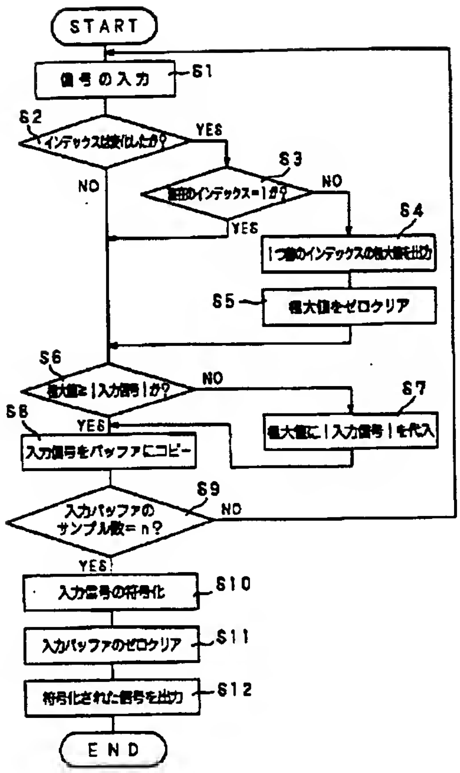
【図５】本発明による信号処理方法により信号の再生を行う際の動作の概略を表し、特にアナログ的に再生レベルのコントロールを行う場合の動作の流れを表すフローチャートである。

【図６】本発明実施例の信号処理装置が適用される一具体例としてのディジタルオーディオ信号の圧縮データ記録再生装置の構成を示すブロック回路図である。

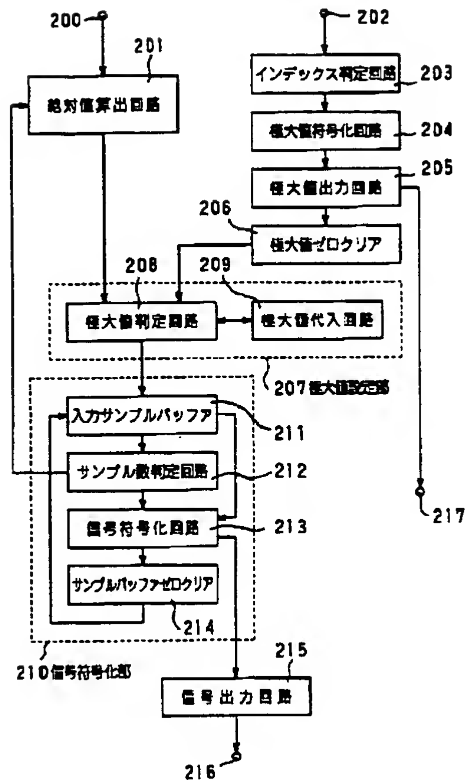
【符号の説明】

２０１　絶対値算出回路
２０３　インデックス判定回路
２０４　極大値符号化回路
２０５　最大値出力回路
２０６　極大値ゼロクリア回路
２０７　極大値設定部
２０８　極大値判定回路
２０９　極大値代入回路
２１０　信号符号化部
２１１，２４９　入力サンプルバッファ
２１２，２５０　サンプル数判定回路
２１３　信号符号化回路
２１４　サンプルバッファゼロクリア回路
２１５，２５３　信号出力回路
２４２　極大値復号化回路
２４３　極大値バッファ
２４４　極大値検出回路
２４７　乗数決定回路
２４８　信号復号化部
２５１　信号復号化回路
２５２　時系列サンプル乗算回路

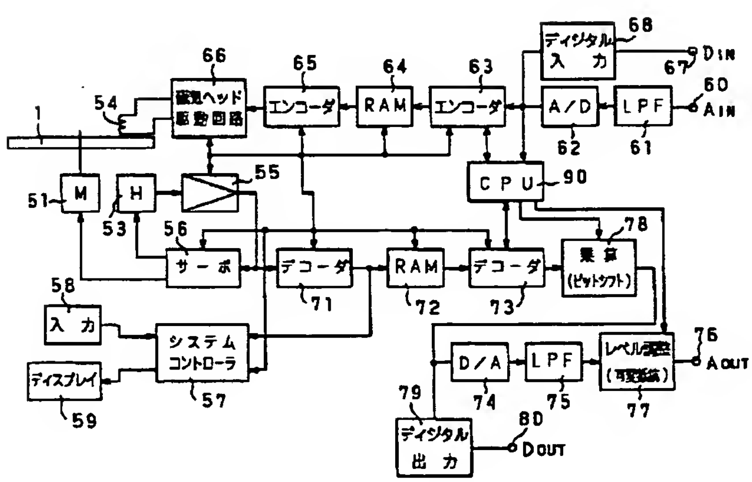
【図1】


START
信号の入力
S1
S2
インデックスは変化したか?
YES
NO
S3
前回のインデックス=1か?
NO
YES
S4
1つ前のインデックスの極大値を出力
S5
極大値をゼロクリア
S6
極大値≧|入力信号|か?
NO
S7
極大値に|入力信号|を代入
S8
YES
入力信号をバッファにコピー
S9
入力バッファのサンプル数=n?
NO
YES
入力信号の符号化
S10
入力バッファのゼロクリア
S11
符号化された信号を出力
S12
END

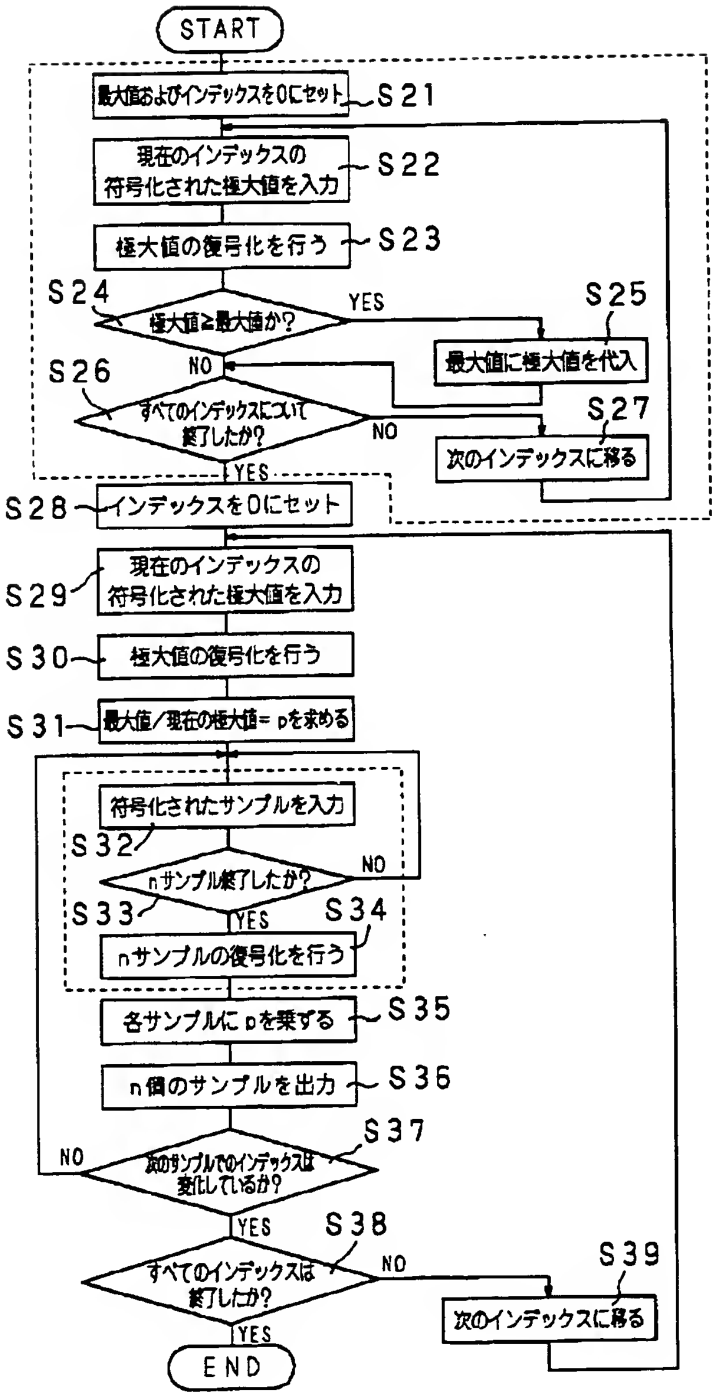
【図2】


200
201
絶対値算出回路
202
インデックス判定回路
203
極大値符号化回路
204
極大値出力回路
205
206
極大値ゼロクリア
208
209
極大値判定回路
極大値代入回路
207 極大値設定部
入力サンプルバッファ
211
サンプル数判定回路
212
信号符号化回路
213
サンプルバッファゼロクリア
214
210 信号符号化部
215
信号出力回路
216
217

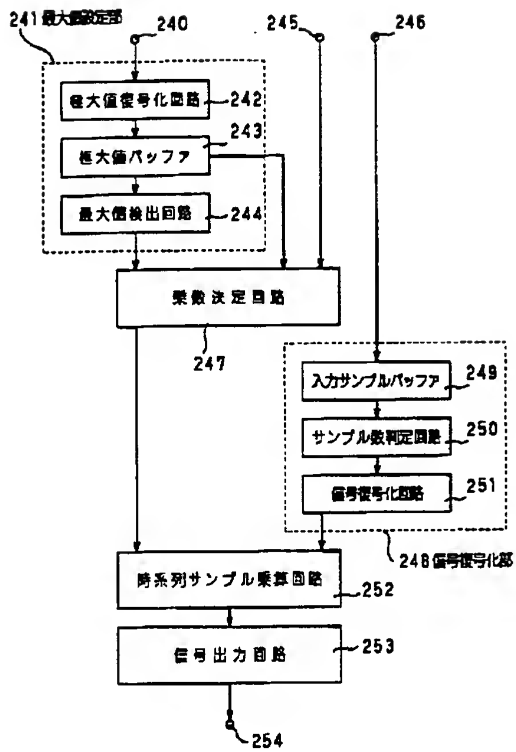
【図6】


68
ディジタル入力
DIN
67
60
AIN
66
磁気ヘッド駆動回路
65
エンコーダ
64
RAM
63
エンコーダ
A/D
LPF
62
61
1
54
55
M
H
51
53
56
CPU
90
78
サーボ
デコーダ
RAM
デコーダ
乗算(ビットシフト)
58
71
72
73
入力
システムコントローラ
57
ディスプレイ
59
76
D/A
LPF
レベル調整(可変抵抗)
AOUT
79
74
75
77
80
ディジタル出力
DOUT

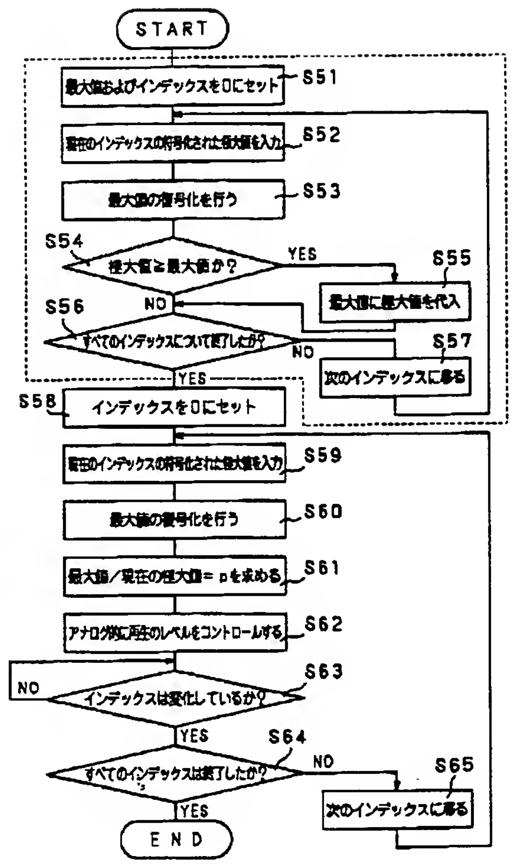
【図3】


START
最大値およびインデックスを0にセット
S21
現在のインデックスの
符号化された極大値を入力
S22
極大値の復号化を行う
S23
S24
極大値≧最大値か?
YES
S25
最大値に極大値を代入
NO
S26
すべてのインデックスについて
終了したか?
NO
S27
次のインデックスに移る
YES
S28
インデックスを0にセット
現在のインデックスの
符号化された極大値を入力
S29
S30
極大値の復号化を行う
S31
最大値/現在の極大値＝pを求める
符号化されたサンプルを入力
S32
nサンプル終了したか?
NO
S33
YES
S34
nサンプルの復号化を行う
各サンプルにpを乗ずる
S35
n個のサンプルを出力
S36
S37
NO
次のサンプルでのインデックスは
変化しているか?
YES
S38
すべてのインデックスは
終了したか?
NO
S39
次のインデックスに移る
YES
END

【図4】


241 最大値設定部
240
245
246
極大値復号化回路
242
243
極大値バッファ
最大値検出回路
244
乗数決定回路
247
入力サンプルバッファ
249
サンプル数判定回路
250
信号復号化回路
251
248 信号復号化部
時系列サンプル乗算回路
252
信号出力回路
253
254

【図5】


START
最大値およびインデックスを0にセット
S51
現在のインデックスの符号化された極大値を入力
S52
最大値の復号化を行う
S53
S54
極大値≧最大値か？
YES
S55
最大値に極大値を代入
S56
NO
すべてのインデックスについて終了したか？
NO
S57
次のインデックスに移る
YES
S58
インデックスを0にセット
現在のインデックスの符号化された極大値を入力
S59
最大値の復号化を行う
S60
最大値／現在の極大値＝ρを求める
S61
アナログ的に再生のレベルをコントロールする
S62
NO
インデックスは変化しているか？
S63
YES
S64
すべてのインデックスは終了したか？
NO
S65
次のインデックスに移る
YES
END

CLAIMS

[Claim(s)]
[Claim 1] The signal-processing approach characterized by detecting the maximal value of the signal level about each partial signal of a real signal which consists of two or more partial signals in the signal-processing approach of a real signal which consists of two or more partial signals, and recording or transmitting the above-mentioned maximal value about each partial signal with the above-mentioned real signal.
[Claim 2] The signal-processing approach according to claim 1 characterized by using the OR of the absolute value of the above-mentioned partial signal as approximate value of the above-mentioned maximal value.
[Claim 3] The signal-processing approach according to claim 1 or 2 characterized by encoding to the maximal value recorded or transmitted.
[Claim 4] The signal record medium characterized by coming to record the signal processed by any 1 term of claim 1 to the claims 3 using the signal-processing approach of a publication.
[Claim 5] The signal-processing approach which detects the maximal value of the signal level about each partial signal of a real signal which consists of two or more partial signals, and is characterized by recording or transmitting the above-mentioned maximal value about each partial signal with the encoded real signal in the signal-processing approach of a real signal which consists of two or more partial signals.
[Claim 6] The signal-processing approach according to claim 5 characterized by using the OR of the absolute value of the above-mentioned partial signal as approximate value of the above-mentioned maximal value.
[Claim 7] The signal-processing approach according to claim 5 or 6 characterized by encoding to the maximal value recorded or transmitted.
[Claim 8] The signal record medium characterized by coming to record the signal processed by any 1 term of claim 5 to the claims 7 using the signal-processing approach of a publication.
[Claim 9] It is the signal-processing approach which reproduces the signal recorded or transmitted using the signal-processing approach according to claim 1 or 2. The playback of a real signal which consists of two or more partial signals with which record or transmission was made is preceded. The signal-processing approach characterized by multiplying by the value which detected the maximum in the inside of the maximal value with which record or transmission of the signal level about each partial signal was made, and **(ed) the detected maximum concerned with the maximal value of each partial signal for every partial signal at the time of playback of a real signal.
[Claim 10] It is the signal-processing approach which reproduces the signal recorded or transmitted using the signal-processing approach according to claim 3. In advance of the playback of a real signal which consists of two or more partial signals with which record or transmission was made, the encoded maximal value with which record or transmission of the signal level about each partial signal was made is decrypted. The signal-processing approach characterized by multiplying by the value which detected the maximum in the inside of each decrypted maximal value concerned, and **(ed) the detected maximum concerned with the maximal value of each partial signal for every partial signal at the time of playback of a real

signal.
[Claim 11] It is the signal-processing approach which reproduces the signal recorded or transmitted using the signal-processing approach according to claim 5 or 6. The playback of a real signal which consists of a partial signal with which the plurality by which record or transmission was made was encoded is preceded. The signal-processing approach characterized by multiplying by the value which detected the maximum in the inside of the maximal value with which record or transmission of the signal level about each partial signal was made, and **(ed) the detected maximum concerned with the maximal value of each partial signal for each [which was decrypted at the time of playback of a real signal] partial signal of every.
[Claim 12] It is the signal-processing approach which reproduces the signal recorded or transmitted using the signal-processing approach according to claim 7. In advance of the playback of a real signal which consists of a partial signal with which the plurality by which record or transmission was made was encoded, the encoded maximal value with which record or transmission of the signal level about each partial signal was made is decrypted. The signal-processing approach characterized by multiplying by the value which detected the maximum in the inside of each decrypted maximal value concerned, and **(ed) the detected maximum concerned with the maximal value of each partial signal for each [which was decrypted at the time of playback of a real signal] partial signal of every.
[Claim 13] The signal-processing approach given in any 1 term of claim 9 to the claims 12 characterized by using a bit shift as the multiplication concerned, using the value of the exponentiation of 2 as approximate value of the multiplier by which each above-mentioned partial signal is multiplied.
[Claim 14] The signal processor characterized by having a detection means to detect the maximal value of the signal level about each partial signal of a real signal which consists of two or more partial signals in the signal processor of a real signal which consists of two or more partial signals, and recording or transmitting the above-mentioned maximal value about each partial signal with the above-mentioned real signal.
[Claim 15] The signal processor according to claim 14 characterized by using the OR of the absolute value of the above-mentioned partial signal as approximate value of the above-mentioned maximal value.
[Claim 16] The signal processor according to claim 14 or 15 characterized by establishing a coding means to encode to the maximal value recorded or transmitted.
[Claim 17] The signal processor characterized by having a detection means to detect the maximal value of the signal level about each partial signal of a real signal which consists of two or more partial signals in the signal processor of a real signal which consists of two or more partial signals, and recording or transmitting the above-mentioned maximal value about each partial signal with the encoded real signal.
[Claim 18] The signal processor according to claim 17 characterized by using the OR of the absolute value of the above-mentioned partial signal as approximate value of the above-mentioned maximal value.
[Claim 19] The signal processor according to claim 17 or 18 characterized by establishing a coding means to encode to the maximal value recorded or transmitted.
[Claim 20] It is the signal processor which reproduces the signal recorded or transmitted using the signal-processing approach according to claim 1 or 2. A detection means to detect the maximum in the inside of the maximal value with which record or transmission of the signal level about each partial signal was made in advance of the playback of a real signal which consists of two or more partial signals with which record or transmission was made. The signal processor characterized by coming to have the multiplication means which multiplies by the value which ** (ed) the detected maximum concerned with the maximal value of each partial signal for every partial signal at the time of playback of a real signal.
[Claim 21] It is the signal processor which reproduces the signal recorded or transmitted using the signal-processing approach according to claim 3. In advance of the playback of a real signal which consists of two or more partial signals with which record or transmission was made, the encoded maximal value with which record or transmission of the signal level about each partial

signal was made is decrypted. The signal processor characterized by coming to have a detection means to detect the maximum in the inside of each decrypted maximal value concerned, and the multiplication means which multiplies by the value which **(ed) the detected maximum concerned with the maximal value of each partial signal for every partial signal at the time of playback of a real signal.

[Claim 22] It is the signal processor which reproduces the signal recorded or transmitted using the signal-processing approach according to claim 5 or 6. A detection means to detect the maximum in the inside of the maximal value with which record or transmission of the signal level about each partial signal was made in advance of the playback of a real signal which consists of a partial signal with which the plurality by which record or transmission was made was encoded, The signal processor characterized by coming to have the multiplication means which multiplies by the value which **(ed) the detected maximum concerned with the maximal value of each partial signal for each [which was decrypted at the time of playback of a real signal] partial signal of every.

[Claim 23] It is the signal processor which reproduces the signal recorded or transmitted using the signal-processing approach according to claim 7. In advance of the playback of a real signal which consists of a partial signal with which the plurality by which record or transmission was made was encoded, the encoded maximal value with which record or transmission of the signal level about each partial signal was made is decrypted. The signal processor characterized by coming to have a detection means to detect the maximum in the inside of each decrypted maximal value concerned, and the multiplication means which multiplies by the value which ** (ed) the detected maximum concerned with the maximal value of each partial signal for each [which was decrypted at the time of playback of a real signal] partial signal of every.

[Claim 24] A signal processor given in any 1 term of claim 20 to the claims 23 characterized by using a bit shift as the multiplication concerned, using the value of the exponentiation of 2 as approximate value of the multiplier by which the above-mentioned partial signal is multiplied.

[Claim 25] It is the signal processor which reproduces claims 1, 2, and 5 or the signal recorded or transmitted using the signal-processing approach given in six. The playback of a real signal which consists of two or more partial signals with which record or transmission was made is preceded. It has the control means to which the maximal value with which record or transmission of the signal level about each partial signal was made is supplied. The control means concerned The signal processor characterized by detecting the maximum in the inside of the above-mentioned maximal value, and controlling a regeneration level in analog for every partial signal according to the maximal value and maximum of each partial signal at the time of playback of a real signal.

[Claim 26] It is the signal processor which reproduces the signal recorded or transmitted using the signal-processing approach according to claim 3 or 7. The playback of a real signal which consists of two or more partial signals with which record or transmission was made is preceded. It has the control means to which the encoded maximal value with which record or transmission of the signal level about each partial signal was made is supplied. The control means concerned The signal processor characterized by decrypting the above-mentioned maximal value, detecting the maximum in the inside of each decrypted maximal value concerned, and controlling a regeneration level in analog for every partial signal according to the maximal value and maximum of each partial signal at the time of playback of a real signal.

[Claim 27] It is the signal processor which reproduces claims 1, 2, and 5 or the signal recorded or transmitted using the signal-processing approach given in six. A detection means to detect the maximal value with which record or transmission of the signal level about each partial signal was made, and the maximum in the inside of each maximal value concerned in advance of the playback of a real signal which consists of two or more partial signals with which record or transmission was made, It is the signal processor which has the control means to which the detection output of the above-mentioned detection means is supplied, and is characterized by the control means concerned controlling a regeneration level in analog for every partial signal according to the maximal value and maximum of each partial signal at the time of playback of a real signal.

[Claim 28] It is the signal processor which reproduces the signal recorded or transmitted using the signal-processing approach according to claim 3 or 7. A decryption means to decrypt the encoded maximal value with which record or transmission of the signal level about each partial signal was made in advance of the playback of a real signal which consists of two or more partial signals with which record or transmission was made, It has a detection means to detect the maximum in the inside of each maximal value concerned from the output of the decryption means concerned, and the control means to which the detection output of the above-mentioned detection means is supplied. The control means concerned The signal processor characterized by controlling a regeneration level in analog for every partial signal at the time of playback of a real signal according to the maximal value and maximum of each partial signal.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention relates digital signals, such as music and voice, to the signal record medium with which the signal processed by this signal-processing approach is recorded on record, the signal-processing approach at the time of transmitting or reproducing and its equipment, and a list.
[0002]
[Description of the Prior Art] Conventionally, in case signals, such as music and voice, are recorded to archive media, such as the so-called compact disk (CD), (sound recording), the level of the sound recording usually differs separately. That is, in the compact disk of two or more sheets, the level of the signal recorded for every disk will differ.
[0003] for this reason, two or more sounds of two or more sheets reproduced from the compact disk (CD) etc. -- since the level of the signal reproduced from each compact disk as mentioned above differed when easy music etc. was recorded on the disk of one sheet in which for example, record playback is possible, in case the disk of one sheet which recorded two or more music concerned is played, a user needs to change a regeneration level for every music, or it is necessary to control
[0004]
[Problem(s) to be Solved by the Invention] Namely, if it becomes common and states, when the music recorded on the inside of one record medium, voice, or the music and voice which were transmitted from one transmission medium are divided into some parts and the level recorded or transmitted for every part differs (for example, when divided for every music), it is necessary to change a regeneration level for every part in the case of the playback.
[0005] Therefore, at the time of playback, change actuation of level must be performed frequently, actuation becomes very complicated, and the burden of the user concerned is increasing the user.
[0006] Then, this invention is made in view of such the actual condition, even when reproducing the signal which was divided into two or more parts, and was recorded or transmitted, a user does not need to perform change actuation of a regeneration level frequently, but it aims at providing with a signal record medium the signal-processing approach which enables the change of a regeneration level effectively and equipment, and a list.
[0007]
[Means for Solving the Problem] This invention is proposed in order to attain the above-mentioned purpose, the signal-processing approach of this invention is the signal-processing approach of a real signal which consists of two or more partial signals, the maximal value of the signal level about each partial signal is detected, and it is characterized by recording or transmitting the above-mentioned maximal value with the above-mentioned real signal. Here, it should encode and the OR of the absolute value of the above-mentioned partial signal can be used for the real signal and the maximal value which are recorded or transmitted as approximate value of the above-mentioned maximal value.
[0008] Next, the signal record medium of this invention comes to record the signal processed by

the signal-processing approach of above-mentioned this invention.
[0009] furthermore, by the signal-processing approach which reproduces the signal which was processed using the signal-processing approach of this invention, and was recorded or transmitted According to the above-mentioned record or the signal-processing approach at the time of transmission, playback of the real signal by which record or transmission was made is preceded. The maximum in the inside of the maximal value with which record or transmission of the signal level about each partial signal was made is detected, and it performs multiplying by the value which **(ed) the detected maximum concerned with the maximal value of each partial signal for every partial signal at the time of playback of a real signal. Moreover, when the maximal value with which record or transmission was made is encoded, in advance of playback of a real signal, the maximal value by which coding was carried out [above-mentioned] is decrypted, the maximum in the inside of each decrypted maximal value concerned is detected, and it performs multiplying by the value which **(ed) the maximum with the maximal value of each partial signal for every partial signal at the time of playback of a real signal. Furthermore, in advance of playback of the encoded real signal, the maximum in the inside of the maximal value with which record or transmission of the signal level about each partial signal was made is detected, and it multiplies by the value which **(ed) the detected maximum concerned with the maximal value of each partial signal for each [which was decrypted at the time of playback of a real signal] partial signal of every. Furthermore, when both a real signal and the maximal value are encoded In advance of playback of the encoded real signal, the encoded maximal value with which record or transmission of the signal level about a partial signal was made is decrypted. The maximum in the inside of each decrypted maximal value concerned is detected, and it performs multiplying by the value which **(ed) the detected maximum concerned with the maximal value of each partial signal for each [which was decrypted at the time of playback of a real signal] partial signal of every.
[0010] Furthermore, by the signal-processing approach of this invention, a bit shift can be used as the multiplication concerned, using the value of the exponentiation of 2 as approximate value of the multiplier by which each above-mentioned partial signal is multiplied.
[0011] Next, the signal processor of this invention is a signal processor of a real signal which consists of two or more partial signals, has a detection means to detect the maximal value of the signal level about each partial signal of a real signal, and is characterized by recording or transmitting the above-mentioned maximal value with the above-mentioned real signal. The real signal and the maximal value which are recorded or transmitted also with the signal processor of this invention should be encoded. Moreover, the OR of the absolute value of each above-mentioned partial signal can be used as approximate value of the above-mentioned maximal value.
[0012] Furthermore, the signal processor which reproduces the signal which was processed using the signal-processing approach of this invention, and was recorded or transmitted A detection means to detect the maximum in the inside of the maximal value with which record or transmission of the signal level about each partial signal was made in advance of playback of the real signal by which record or transmission was made, It has the multiplication means which multiplies by the value which **(ed) the detected maximum concerned with the maximal value of each partial signal for every partial signal at the time of playback of a real signal. A detection means when the maximal value recorded or transmitted is encoded by ** detects the maximum in the inside of each of that maximal value, after decrypting the maximal value by which the signal level about each partial signal was encoded. Moreover, it multiplies by the multiplication means when the real signal recorded or transmitted is encoded for each [which decrypted the value which **(ed) maximum detected with the detection means with the maximal value of each partial signal at the time of playback of a real signal] partial signal of every. Furthermore, when both a real signal and the maximal value are encoded, the encoded maximal value with which record or transmission was made in the detection means is decrypted, the maximum in the inside of each decrypted maximal value concerned is detected, and it multiplies by the value which ** (ed) the detected maximum concerned with the maximal value of each partial signal in the multiplication means for each [which was decrypted at the time of playback of a real signal]

partial signal of every.
[0013] Also in the signal processor of this invention, a bit shift can be used as the multiplication concerned, using the value of the exponentiation of 2 as approximate value of the multiplier by which each above-mentioned partial signal is multiplied.
[0014] Moreover, the signal processor of this invention which reproduces the signal which was processed using the signal-processing approach of this invention, and was recorded or transmitted Playback of the real signal which can also control a regeneration level in analog for example, by which record or transmission was made is preceded. It has the control means to which the maximal value with which record or transmission of the signal level about each partial signal was made is supplied. The control means concerned The maximum in the inside of the above-mentioned maximal value is detected, and a regeneration level is controlled in analog for every partial signal according to the maximal value and maximum of each partial signal at the time of playback of a real signal. Moreover, a detection means to detect the maximal value with which record or transmission of the signal level about each partial signal was made, and the maximum in the inside of each maximal value concerned to this signal processor that controls a regeneration level in analog can be established, and a regeneration level can also be controlled by the control means in analog for every partial signal according to the maximal value and maximum of each partial signal which were detected with the above-mentioned detection means at the time of playback of a real signal.
[0015] furthermore, when the maximal value with which record or transmission is made is encoded in the signal processor of this invention which controls a regeneration level in analog This encoded maximal value is supplied to a control means. The control means concerned The above-mentioned maximal value is decrypted, the maximum in the inside of each decrypted maximal value concerned is detected, and what controls a regeneration level in analog for every partial signal at the time of playback of a real signal is considered according to the maximal value and maximum of each partial signal. Furthermore, the encoded maximal value is also being able to decrypt with a decryption means and detecting the maximum in the inside of each maximal value concerned from the output of the decryption means concerned with a detection means further, before ******(ing) to a control means today, and a control means controls a regeneration level in analog for every partial signal according to this maximal value and maximum that were detected at the time of playback of a real signal.
[0016]
[Function] In case the record or transmission of a real signal which consists of two or more partial partial signals is performed according to the signal-processing approach of this invention, and equipment The maximal value of the signal level about each partial signal is detected, and this maximal value is recorded or transmitted with the real signal. At the time of playback The maximum of that maximal value, The maximal value of the partial signal to reproduce is compared, and when the maximal value of the partial signal to reproduce is smaller, he is trying to reproduce the level of the part together with the level of the maximum value part part signal automatically.
[0017] Moreover, according to the signal record medium of this invention, since the maximal value of the signal level about each partial signal is recorded with the real signal, the maximal value can be used for the level control at the time of playback.
[0018]
[Example] Hereafter, the desirable example of this invention is explained, referring to a drawing.
[0019] Drawing 1 is a flow chart which shows the explanation of operation at the time of performing the record or transmission of a signal in the signal processor with which the signal-processing approach of this invention is applied. From step S2 of this drawing 1 to step S9 expresses down stream processing of actuation of an important section.
[0020] In this drawing 1 , the time series sample data of voice or music is inputted as a real signal at the first step S1. The terminal input from the thing read in the record medium or another equipment etc. may be used for the input of a signal here, and especially the approach of the input concerned cannot be limited but can apply various approaches.
[0021] The index with which the sample data of the time series by which the input was carried

out [above-mentioned] expresses with the following step S2 whether it is what is contained in the part of what position of the whole judges whether it changed with the time of a front sample. In addition, this index can be considered to be the same thing as the index of Q data format of said compact disk, therefore can mention digital signals, such as musical music, as an example as the above-mentioned part. Moreover, especially limitation of in what kind of form the index concerned is inputted like the case of the above-mentioned time series sample data is not performed. In this step S2, when it judges with not changing to the following step S3 again when it judges with the above-mentioned index changing (yes) (no), it progresses to step S6.
[0022] At step S3, a current index judges whether it is "1", when it judges with it being "1" (yes), it progresses to step S6, and when it judges with it not being "1" (no), it progresses to step S4.
[0023] In step S4, the maximal value of each sample data corresponding to the index in front of current one, i.e., a partial signal, is outputted, and it progresses to the following step S5. In the step S5 concerned, the zero clear of the maximal value memorized previously is carried out, and it progresses to step S6.
[0024] At the following step S6, the maximal value is larger, or as compared with the absolute value of input sample data, in being equal (yes), it progresses to step S8, and the maximal value memorized is progressed to step S7, when the maximal value is conversely smaller (no).
[0025] At step S7, the absolute value of the above-mentioned input sample data is substituted for the maximal value, and it progresses to step S8. In addition, although it is not smaller than the absolute value of input sample data, you may make it substitute the approximate value which is a near value instead of substituting the absolute value of input sample data for the maximal value here.
[0026] At the following step S8, input sample data is copied to an input sample buffer, and it progresses to the following step S9.
[0027] In this step S9, when it judges with it not being equal to the following step S10 when it judges whether it is equal to measurement size n beforehand set up for coding of the measurement size stored in the above-mentioned input sample buffer and judges with it being equal (yes) (no), it returns to step S1.
[0028] At step S10, it encodes using each sample data of the above-mentioned measurement size n stored in the above-mentioned input sample buffer, and progresses to the following step S11. It is also possible to use compression coding which may carry out to Above n changing by the approach of coding and encoding it at a time one sample as n= 1 here, and may carry out to encoding the block which makes n plurality and consists of two or more of these samples, for example, is mentioned later. or [moreover, / omitting the above-mentioned step S8 and step S9 in this case by the ability also direct-recording or also transmitting / not encoding step S10, but / input sample data] -- or it does not omit -- what is necessary is just to make it consider n= 1, if it becomes In addition, although this example has described the example which encodes, it is also considered that it is made not to encode, either as mentioned above, and it does not limit especially about whether the approach of coding and coding are performed here. In not encoding, in case it outputs a signal in step S12 mentioned later, the direct output of an input signal, i.e., the real signal, will be carried out.
[0029] At the next step S11 of the above-mentioned step S10, all the data in the used input sample buffer are transposed to 0, and it progresses to the following step S12. In the step S12 concerned, the encoded signal is outputted and processing is ended after that. In addition, naturally this step S12 will be skipped, when the above-mentioned step S8 and step S9 are omitted.
[0030] Next, the configuration of the important section at the time of performing record or transmission to drawing 2 in the signal processor of this invention example with which the signal-processing approach of this invention is applied is shown.
[0031] In this drawing 2 , the absolute value calculation circuit 201 computes the absolute value of the time series sample data which is the real signal supplied from the terminal 200, and performs processing which sends this absolute value to the maximal value judging circuit 208 of the maximal value setting section 207 with the sample data by which the input was carried out

[above-mentioned].
[0032] Moreover, the data of the index with which the sample data by which the input was carried out [above-mentioned] expresses whether it is the signal included in which part of the whole are supplied to the index judging circuit 203 through a terminal 202, and if the index concerned has changed with the index in front of one, processing which sends the index to the maximal value coding network 204 will be performed in the index judging circuit 203 concerned.
[0033] In the maximal value coding network 204 concerned, the maximal value to the above-mentioned index is detected from the input sample data from the above-mentioned terminal 200, the supplied maximal value is encoded, this is outputted, and this is sent to the maximal value output circuit 205. In addition, although what has various normalization multipliers used in case the thing which uses the number of bits of the maximal value, for example as a sign, or input sample data is encoded as the approach of coding in this maximal value coding network 204 can be considered, especially limitation is not performed here. Moreover, since coding of the maximal value concerned is not indispensable conditions in this invention, it is good also as what is not performed. The flow chart of drawing 1 mentioned above shows the example which does not perform the coding concerned.
[0034] In the next maximal value output circuit 205, while outputting the maximal value obtained by processing of each sample data corresponding to the index in front of one, i.e., a partial signal, through a terminal 217, the recognition signal which shows the purport which outputted the maximal value is sent to the maximal value zero-clear circuit 206.
[0035] In the maximal value zero-clear circuit 206 concerned, while carrying out the zero clear of the memory currently used for storage of the maximal value according to the above-mentioned recognition signal, the recognition signal which shows the purport concerned which carried out the zero clear to the above-mentioned maximal value judging circuit 208 of the maximal value setting section 207 is sent.
[0036] In the above-mentioned maximal value judging circuit 208, the maximal value obtained by processing to each sample data corresponding to the index in front of one and the absolute value output from said absolute value calculation circuit 201 are measured, and when the above-mentioned maximal value is larger, the time series sample data itself sent from the above-mentioned absolute value calculation circuit 201 is sent to the input sample buffer 211 of the signal coding section 210. On the contrary, when the absolute value of this sample data is larger, it not only sends the above-mentioned time series sample data to the above-mentioned input sample buffer 211, but it sends the absolute value concerned to the maximal value substitution circuit 209.
[0037] The inputted absolute value concerned is substituted for the maximal value substitution circuit 209 concerned to the memory allocated to the maximal value.
[0038] Although the above-mentioned maximal value judging circuit 207 and the maximal value substitution circuit 209 constitute the maximal value setting section 207 which sets up the maximal value, they may be made to take the OR of the absolute value output of the above-mentioned absolute value calculation circuit 201 instead of these processings, and to output as approximate value of the maximal value of this partial signal.
[0039] In the following signal coding section 210, the data of the measurement size stored in the above-mentioned input sample buffer 211 are sent to the measurement size judging circuit 212, and it judges whether the several n sample data beforehand set up for coding is stored in the measurement size judging circuit 212 concerned. In this measurement size judging circuit 212, when it judges with the measurement size stored in the above-mentioned input sample buffer 211 not fulfilling required measurement size n, the recognition signal which shows that is sent to the absolute value calculation circuit 201, and processing which this mentioned above about a new input sample is performed. Moreover, in the measurement size judging circuit 212, when it judges with the measurement size required for the input sample buffer 211 having been stored, the recognition signal which shows that from the measurement size judging circuit 212 concerned to the signal coding network 213 is sent.
[0040] In the signal coding network 213 concerned, after it will encode the sample data of the above-mentioned measurement size n supplied from the above-mentioned input sample buffer

211 if the recognition signal concerned is supplied, and delivery and these processings end the encoded sample data concerned to the signal output circuit 215, the recognition signal which shows that is sent to the sample buffer zero-clear circuit 214.
[0041] In the above-mentioned sample buffer zero-clear circuit 214, supply of the recognition signal which shows termination of the above-mentioned processing from the above-mentioned signal coding network 213 carries out the zero clear of the above-mentioned input sample buffer 211.
[0042] Although the signal coding section 210 consists of the above-mentioned input sample buffer 211, a measurement size judging circuit 212, a signal coding network 213, and a sample buffer zero-clear circuit 214, when not encoding sample data, there is no need and, as for these components, the output of the maximal value judging circuit 208 will be sent to the direct signal output circuit 215.
[0043] In the above-mentioned signal output circuit 215, the supplied sample data (when not encoding, it is the sample data concerned itself which is not encoded) which was encoded is outputted to external terminal 216 grade, and processing is ended.
[0044] Next, drawing 3 is a flow chart which shows the actuation at the time of reproducing a signal in the signal processor of this invention. From step S21 of this drawing 3 to the step S39 shows down stream processing of playback actuation.
[0045] In this drawing 3 , as initialization, the maximum and the index of the maximal value are set to 0, and it progresses to the following step S22 at step S21.
[0046] At the step S22 concerned, said encoded maximal value corresponding to current each sample data, i.e., partial signal, of an index reproduced or transmitted, for example from the record medium is inputted, and it progresses to the following step S23. At this step S23, the maximal value by which coding was carried out [above-mentioned] is decrypted, and it progresses to the following step S24. In addition, about the approach of coding here and a decryption, especially limitation is not performed like the time of actuation of the record mentioned above or transmission. Moreover, when it is data with which the inputted maximal value is not encoded, the above-mentioned step S23 is skipped.
[0047] At step S24, as compared with the maximum of the maximal value till then, when the decrypted maximal value concerned is larger than the above-mentioned maximum (yes), it progresses to the following step S25, and the maximal value (when coding is not performed, it is the maximal value concerned itself which is not encoded) by which the decryption was carried out [above-mentioned] is progressed to step S26, when the maximum is conversely larger (no).

[0048] At the above-mentioned step S25, the above-mentioned maximum is transposed to the decrypted maximal value concerned, and it progresses to the following step S26. At the step S26 concerned, when judging whether the above-mentioned processing was completed and having ended about no indexes (no), after moving to the following index at step S27, it returns to step S22. On the contrary, in step S26, when it is judged that the above-mentioned processing is completed about all indexes (yes), it progresses to the following step S28.
[0049] In the signal processor of this example, the maximum of the maximal value about all the partial signals of the regenerative signal (real signal) with which playback is made in step S28 from the above step S21 is calculated.
[0050] Next, at step S28, the index for playback is anew set to 0, and it progresses to the following step S29. At this step S29, it progresses to step S30, after inputting the maximal value by which coding of the partial signal corresponding to a current index was carried out [above-mentioned]. The encoded maximal value concerned is decrypted at this step S30. In addition, when the maximal value is encoded as mentioned above and it is not recorded or transmitted, this step S30 is skipped.
[0051] At the following step S31, when processing is completed at said step S26, the value p which broke the maximum already calculated by the maximal value asked at step S29 is calculated, and it progresses to step S32 after that.
[0052] At step S32, the sample data which coding was carried out, and was recorded or transmitted [above-mentioned] is inputted, and it progresses to step S33. At this step S33, it

judges whether it was carried out by n sample required for a decryption, and when [concerned] it judges with the input for n sample yet not being completed (no), it progresses to step S32, and the input concerned progresses to the following step S34, when it judges with having ended (yes), return and.
[0053] At this step S34, the n above-mentioned sample data are decrypted and it progresses to the following step S35. In addition, since step S32 to the step S34 is the process which is needed when a signal is encoded and it is recorded or transmitted, when record or transmission is performed in the form [being inputted without encoding a signal], it is skipped.
[0054] At the following step S35, it progresses to step S36, after multiplying each sample data decoded in step S34 by p. At this step S36, n sample data which multiplied by p in the above-mentioned step S35 are outputted, and it progresses to step S37.
[0055] At this step S37, when it judges with whether the value of the index corresponding to the following sample is changing, and it not judging and changing (no), it returns to step S32, and when a decryption of a signal is continued and it judges that it was changing further (yes), it progresses to step S38.
[0056] At the step S38 concerned, when it judges with judging whether the above-mentioned processing about the partial signal corresponding to all indexes was completed, and having not ended (no), after progressing to the following step S39 and carrying out 1 **** of the values of an index at the step S39 concerned, it returns to step S29. On the other hand, when it judges with processing having been completed at step S38 (yes), processing of signal regeneration is ended.
[0057] Next, the configuration which performs the above-mentioned playback of the signal processor which used the signal-processing approach of this invention to drawing 4 is shown.
[0058] In this drawing 4 , the maximal value which was detected by the signal processor of said this invention example, and was encoded on the occasion of record or transmission is inputted through terminal 240 grade, a decryption of the encoded maximal value concerned about the partial signal corresponding to all indexes is made here, and it is sent to that posterior pole large value buffer 243 in the maximal value decryption circuit 242 of the maximum setting section 241. In addition, when the maximal value concerned is not encoded as mentioned above on the occasion of record of the maximal value, or transmission, the maximal value decryption circuit 242 concerned will be omitted, and the maximal value which was not encoded will be directly sent to the maximal value buffer 243.
[0059] In the next maximum detector 244, the maximum of all the maximal value stored in the above-mentioned maximal value buffer 243 is detected, and the maximum concerned is sent to the multiplier decision circuit 247. In addition, you may make it replace with the ability to search for the OR of all the maximal value as approximate value of the maximum concerned instead of calculating the above-mentioned maximum directly, when there is constraint of a hardware scale etc. here.
[0060] Next, in the above-mentioned multiplier decision circuit 247, the multiplier over each sample data of the partial signal corresponding to the index concerned is computed by **(ing) supply ****** maximum from the above-mentioned maximum detector 244 with the maximal value to which it corresponds in the maximal value buffer 243 corresponding to the index inputted through the terminal 245 grade. In addition, the number of the exponentiations of 2 is adopted as approximate value of the multiplier concerned here, and it may be made to realize the multiplication to each sample data by carrying out the bit shift of each sample data concerned.
[0061] Moreover, the reproduced signal (sample data) is supplied to a terminal 246, and this is savings ** to the input sample buffer 249 of the signal decryption section 248. In the next measurement size judging circuit 250, it judges whether the measurement size required for a decryption was stored to the above-mentioned input sample buffer 249. When it judges with the measurement size required for the above-mentioned decryption having been stored in the above-mentioned input sample buffer 249 in the measurement size judging circuit 250 concerned, the sample data currently stored in the above-mentioned input sample buffer 249 is sent to the next signal decryption circuit 251, and is decoded here. The time series sample data which might get twisted in the decryption of this signal decryption circuit 251 is sent to the time

series sample multiplication circuit 252.
[0062] In addition, when coding of a signal is not performed as mentioned above, the signal decryption section 248 which consists of the above-mentioned input sample buffer 249, a measurement size judging circuit 250, and a signal decryption circuit 251 will be omitted, and the playback input signal from a terminal 246 will be sent to the direct time series sample multiplication circuit 252. Moreover, although the case where fixed numbers block this example a sample every, and it encodes also about coding and the decryption approach of a signal is mentioned as the example, the approach of encoding using non-blocking operations, such as a filter, may be adopted, and especially limitation is not performed. Furthermore, the input terminal into which the above-mentioned maximal value, an index, and an input signal are inputted may be made to perform this with one or more terminals.
[0063] In the time series sample multiplication circuit 252, the multiplication of the multiplier from the above-mentioned multiplier decision circuit 247 and the time series sample data from the signal decryption circuit 251 is performed, and the time series sample data (time series sample data to which the multiplication of the above-mentioned multiplier was carried out) of the result is outputted to the signal output circuit 253. In addition, when the exponentiation of 2 is adopted as a multiplier as mentioned above, a bit shift can perform the multiplication in the above-mentioned time series sample multiplication circuit 252.
[0064] In the above-mentioned signal output circuit 253, the time series sample data to which the above-mentioned multiplication was performed is outputted to terminal 254 grade, and processing is ended.
[0065] Next, in drawing 3 and drawing 4 which were mentioned above, although gain of a regenerative signal is controlled in digital one, this invention is included, also when performing processing same in analog.
[0066] The flow chart which explains the actuation in the case of controlling the level of a regenerative signal in analog by the signal-processing approach of this invention to drawing 5 is shown. Actuation from step S51 of this drawing 5 to step S65 shows each process of operation of controlling signal level in analog. Moreover, step S61 ** detects the greatest thing in the maximal value about each partial signal similarly from step S51 with step S21 to the step S31 of said drawing 3 , and since it is what calculates the value which **(ed) this maximum with the maximal value of each partial signal, the explanation is omitted here.
[0067] In this drawing 5 , level is controlled in analog at step S62 according to the value acquired at the same step S61 as step S31 of said drawing 3 . In this case, since it has the effectiveness same with multiplying by p in digital ones, processing which adjusts reproductive level in the configuration of the analog circuit after digital ones / analog (D/A) conversion is performed.
[0068] In addition, although the configuration of moving the contact of variable resistance automatically according to the value of Above p can be considered while controlling the attenuation of a signal by variable resistance in amplifier in order to realize step S62 concretely as a configuration here for example, especially limitation is not performed here.
[0069] At the following step S63, when it judges with whether the index of the partial signal which is carrying out current playback is changing, and it judging and changing (yes), it progresses to the following step S64. On the contrary, the same actuation is repeated until return changes to the same step S63 and then an index changes, when it judges with not changing in the step S63 concerned (no).
[0070] At step S64, when it judges with judging whether the processing about the partial signal of all indexes was completed, and having not ended (no), it progresses to step S65. In this step S65, it moves to the following index and the processing from the above-mentioned step S59 is repeated. On the other hand, when it judges with processing being completed about the partial signal of all indexes at step S64 (yes), processing of the analog-level control of this drawing 5 is ended.
[0071] It becomes possible to change a regeneration level effectively, losing change actuation of the regeneration level for every partial signal by the user at the time of playback, and mitigating a user's burden, in case the real signal which consists of two or more partial signals recorded or transmitted in the signal-processing approach of this invention and equipment is reproduced,

since it seems that it mentioned above.
[0072] Next, compression coding of the digital audio signal is carried out as one example in which the signal processor which realizes the signal-processing approach of this invention mentioned above is applied to drawing 6 , it records on a record medium, and the outline configuration of the compressed data record regenerative apparatus which carries out the expanding decryption of the signal reproduced from the record medium is shown.
[0073] In this drawing 6 , control of a setup of the maximal value, the gain control of a regenerative signal, etc. in the signal-processing approach of this example mentioned above is performed by the central processing unit (CPU) 90, and coding processing in said maximal value coding network 204 or the signal coding section 210 is further performed for said maximal value decryption circuit 241, decryption processing in the signal decryption section 248, etc. by the decoder 73 in an encoder 63. In addition, about coding and a decryption of the maximal value, it can carry out not in an encoder 63 and the decoder 73 but in the above CPU 90. Furthermore, in the multiplication circuit 78, analog-gain control (gain accommodation) is performed for said digital gain control (gain accommodation) corresponding to said time series sample multiplication circuit 252 in the level control circuit 77.
[0074] In the compressed data record regenerative apparatus 9 shown in this drawing 6 , the magneto-optic disk 1 by which a rotation drive is carried out with a spindle motor 51 is first used as a record medium. In addition, a diameter can use the so-called mini disc (MD) named generically as a magneto-optic disk which is 64mm for this magneto-optic disk 1. At the time of record of the data to this magneto-optic disk 1, by impressing the modulation field according to record data by the magnetic head 54, where a laser beam is irradiated by the optical head 53, the so-called field modulation record is performed and data are recorded along the recording track of a magneto-optic disk 1. Moreover, at the time of playback, the recording track of above-mentioned optical MAG DISUSUKU 1 is traced by the laser beam by the optical head 53, and it reproduces in magneto-optics.
[0075] The optical head 53 consists of photodetectors which have the light sensing portion of optics, such as laser light sources, such as a laser diode, a collimator lens, an objective lens, a polarization beam splitter, and a cylindrical lens, and a predetermined pattern. This optical head 53 is formed in the above-mentioned magnetic head 54 and the location which counters through the magneto-optic disk 1. When recording data on a magneto-optic disk 1, while driving the magnetic head 54 by the head drive circuit 66 of the recording system mentioned later and impressing the modulation field according to record data, a field modulation technique performs heat magnetic recording by irradiating a laser beam on the purpose truck of a magneto-optic disk 1 by the optical head 53. Moreover, this optical head 53 detects the reflected light of the laser beam which irradiated the purpose truck, detects a focal error by the so-called astigmatism method, for example, detects a tracking error by the so-called push pull method. When reproducing data from a magneto-optic disk 1, the optical head 53 detects the difference in the polarization angle (car angle of rotation) of the reflected light from the purpose truck of a laser beam, and generates a regenerative signal at the same time it detects the above-mentioned focal error and a tracking error.
[0076] The output of the optical head 53 is supplied to the RF circuit 55. This RF circuit 55 is supplied to the decoder 71 of the reversion system which makes a regenerative signal binary and mentions it later while it extracts the above-mentioned focal error signal and a tracking error signal from the output of the optical head 53 and supplies them to the servo control circuit 56.
[0077] The servo control circuit 56 consists of for example, a focus servo control circuit, a tracking servo control circuit, a spindle motor servo control circuit, a thread servo control circuit, etc. The above-mentioned focus servo control circuit performs focal control of the optical system of the optical head 53 so that the above-mentioned focal error signal may become zero. Moreover, the above-mentioned tracking servo control circuit performs tracking control of the optical system of the optical head 53 so that the above-mentioned tracking error signal may become zero. Furthermore, the above-mentioned spindle motor servo control circuit controls a spindle motor 51 to carry out the rotation drive of the magneto-optic disk 1 with a predetermined rotational speed (for example, constant linear velocity). Moreover, the above-

mentioned thread servo control circuit moves the optical head 53 and the magnetic head 54 to the purpose truck location of a magneto-optic disk 1 specified by the system controller 57. The servo control circuit 56 which performs such various control action sends the information which shows the operating state of each part controlled by this servo control circuit 56 to a system controller 57.

[0078] The key input control unit 58 and the display 59 are connected to the system controller 57. This system controller 57 performs control of a recording system and a reversion system by the mode of operation specified by the actuation input by the key input control unit 58. Moreover, a system controller 7 manages the record location and playback location on the above-mentioned recording track which the optical head 53 and the magnetic head 54 are tracing based on the address information of the sector unit reproduced with a header time, Q data of a sub-code, etc. from the recording track of a magneto-optic disk 1. Furthermore, a system controller 57 performs control to which playback time amount is displayed on a display 59 based on a data compression rate and the playback positional information on the above-mentioned recording track. In addition, the system controller 57 concerned can perform processing by said CPU90, and does not need to form said CPU90 in this case.

[0079] By carrying out the multiplication of the inverse number (for example, the time of 1/4 compression 4) of a data compression rate to the address information (absolute time information) of the sector unit reproduced from the recording track of a magneto-optic disk 1 with the so-called header time, the so-called sub-code Q data, etc., the above-mentioned playback time amount display searches for an actual hour entry, and displays this on a display 59. In addition, when absolute time information is beforehand recorded, for example on recording tracks, such as a magneto-optic disk, at the time of record (preformatted), it is also possible to display the current position by actual chart lasting time by reading this preformatted absolute time information and carrying out the multiplication of the inverse number of a data compression rate.

[0080] Next, in the recording system of the record playback machine of this disk record regenerative apparatus, the analog audio input signal AIN from an input terminal 60 is supplied to A/D converter 62 through a low pass filter 61. This A/D converter 62 quantizes the above-mentioned analog audio input signal AIN. The digital audio signal obtained from A/D converter 62 is supplied to the ATC(Adaptive Transform Coding) PCM encoder 63. Moreover, the digital audio signal of above-mentioned A/D converter 62 is sent also to said CPU90. CPU90 at this time generates said index from the digital audio signal concerned, and sends it to the above-mentioned ATC encoder 63.

[0081] On the other hand, the digital audio input signal DIN which contains an index in an input terminal 67 at least from other record regenerative apparatus of these is supplied, and this input signal DIN is supplied to the ATC encoder 63 and the above CPU 90 through the digital input interface circuitry 68. CPU90 concerned at this time processes a setup of the maximal value corresponding to the signal-processing approach at the time of record of this invention mentioned above using the above-mentioned index and the digital audio signal etc., and sends the obtained data to the above-mentioned ATC encoder 63.

[0082] An encoder 63 also performs coding of said maximal value, and sends these to memory 64 while it performs bit compression (data compression) processing to the time series sample data supplied through digital audio PCM data and the digital input interface circuitry 68 of a predetermined transfer rate which quantized the above-mentioned input signal AIN with above-mentioned A/D converter 62. In addition, in the data compression in the above-mentioned encoder 63, although the compressibility concerned is explained as 4 times, this example has this scale factor with the configuration for which it does not depend, and can be chosen as arbitration by the application.

[0083] Next, writing and read-out of data are controlled by the system controller 57, and memorize temporarily the ATC data supplied from the ATC encoder 63, and memory 64 is used as buffer memory for recording on a disk if needed. That is, the compression audio data by which high efficiency coding was made by the ATC encoder 63 are reduced 1/4 of the data transfer rate (75 sectors / second) of a CD-DA format with that standard data transfer rate, i.e., 18.75

sectors / second, for example, and this compressed data is continuously written in memory 14. If 1 sector per 4 sectors is recorded when being compressed 4 times, as mentioned above, it is sufficient for this compressed data (ATC data), but since such record of every 4 sectors is next to impossible as a matter of fact, it is made to record sector continuation which is mentioned later. This record is burstily performed through an idle period with the same data transfer rate (75 sectors / second) as a standard CD-DA format by making into a record unit the cluster which consists of predetermined two or more sectors (for example, 32 sector + number sector). That is, in the memory 14 concerned, the ATC audio data continuously written in with the low transfer rate of the 18.75 (= 75/4) sectors / second according to the above-mentioned bit compression rate are burstily read with the transfer rate of the above-mentioned 75 sectors / second as record data. the instant-data transfer rate within the time amount of the record actuation burstily performed although the overall data transfer rate containing a record idle period is the low rate of the above-mentioned 18.75 sectors / second about this data read and recorded -- the above -- standard 75 sectors / second have come. Therefore, when it is the same rate (constant linear velocity) as the CD-DA format with a standard disk rotational speed, record of the same recording density as a year worth CD-DA format and a storage pattern will be performed.
[0084] record data burstily read from the above-mentioned memory 64 with the transfer rate (an instant ---like) of the above-mentioned 75 sectors / second, such as ATC audio data, are supplied to an encoder 65. Here, the unit by which continuation record is carried out by one record in the data stream supplied to an encoder 65 from the above-mentioned memory 64 is made into the number sector for cluster connection allotted to this cluster [which consists of two or more sectors (for example, 32 sectors)], and cluster order location. This sector for cluster connection is set up for a long time than the interleave length in an encoder 65, and even if it interleaves, he is trying not to affect the data of other clusters.
[0085] An encoder 65 performs coding processing (parity addition and interleave processing), EFM coding processing, etc. for an error correction about the record data burstily supplied as mentioned above from memory 64. The record data with which coding processing by this encoder 65 was performed are supplied to the magnetic-head drive circuit 66. The magnetic head 54 is connected, and this magnetic-head drive circuit 66 drives the magnetic head 54 so that the modulation field according to the above-mentioned record data may be impressed to a magneto-optic disk 1.
[0086] Moreover, a system controller 57 controls a record location to record continuously the above-mentioned record data burstily read from memory 64 by this memory control on the recording track of a magneto-optic disk 1 while performing memory control like **** to memory 64. Control of this record location manages the record location of the above-mentioned record data burstily read from memory 64 by the system controller 57, and is performed by supplying the control signal which specifies the record location on the recording track of a magneto-optic disk 1 to the servo control circuit 56.
[0087] Next, the reversion system of this magneto-optic-disk record playback unit is explained. the playback output which this reversion system is for reproducing the record data continuously recorded by the above-mentioned recording system on the recording track of a magneto-optic disk 1, and is obtained by tracing the recording track of a magneto-optic disk 1 by the laser beam by the optical head 53 -- the RF circuit 55 -- binary -- it has the decoder 71-izing [the decoder] and supplied. At this time, not only a magneto-optic disk but read-out of the same optical disk only for playbacks as the so-called compact DIKUSU (CD:Compact Disc) can be performed.
[0088] Corresponding to the encoder 65 in an above-mentioned recording system, about the playback output made binary by the RF circuit 55, a decoder 71 processes decryption processing, EFM decryption processing, etc. like **** for an error correction, and reproduces audio data etc. with the transfer rate of 75 sectors / second earlier than the transfer rate of normal. The playback data obtained by this decoder 71 are supplied to memory 72.
[0089] Writing and read-out of data are controlled by the system controller 57, and memory 72 is written in at the transfer rate of 75 sectors / second of those burstily [the playback data

supplied with the transfer rate of 75 sectors / second from a decoder 71]. Moreover, this memory 72 is read at the transfer rate 18.75 sector / second of 75 sectors / second of normal continuously [the above-mentioned playback data burstily written in with the transfer rate of the above-mentioned 75 sectors / second].

[0090] A system controller 57 performs memory control which reads the above-mentioned playback data from memory 72 continuously with the transfer rate of the above-mentioned 18.75 sectors / second while writing playback data in memory 72 with the transfer rate of 75 sectors / second. Moreover, a system controller 57 controls a playback location to reproduce continuously the above-mentioned playback data burstily written in by this memory control from memory 72 from the recording track of a magneto-optic disk 1 while performing memory control like **** to memory 72. Control of this playback location manages the playback location of the above-mentioned playback data burstily read from memory 72 by the system controller 57, and is performed by supplying the control signal which specifies the playback location on the recording track of a magneto-optic disk 1 or an optical disk 1 to the servo control circuit 56.

[0091] The ATC audio data obtained as playback data continuously read from the above-mentioned memory 72 with the transfer rate of 18.75 sectors / second are supplied to the ATC decoder 73. This ATC decoder 73 also performs a decryption of said encoded maximal value while reproducing 16-bit digital audio data by increasing the data elongation (bit elongation) of the ATC data of an audio 4 times. While the digital audio data from this ATC decoder 73 are sent to D/A converter 74 through the multiplication circuit 78, it is sent also to said CPU90 and the data of the above-mentioned maximal value and an index are also further sent to this CPU90.

[0092] CPU90 at this time processes multiplier decision corresponding to the signal-processing approach at the time of playback of this invention mentioned above using the above-mentioned index, the maximal value, and digital audio data etc., and sends the obtained data to the multiplication circuit 78 or the level control circuit 77. That is, in performing gain control to a regenerative signal in digital one, in performing a multiplier in the above-mentioned multiplication circuit 78 in [again] analog, it sends the control signal of variable resistance to it at the level control circuit 77.

[0093] Here, when performing gain control in digital one, the multiplication of the multiplier from the above CPU 90 is carried out in the above-mentioned multiplication circuit 78, and this digital data with which gain control was performed in digital one is sent to D/A converter 74. This D/A converter 74 changes into an analog signal the digital audio data supplied from the ATC decoder 73. The output of this D/A converter 74 is analog audio signal AOUT to which the level control circuit 77 was passed as it was through the low pass filter 75, and gain control was performed in digital one. It carries out and is outputted from an output terminal 76. In addition, with the configuration which performs only this digital gain control, the level control circuit 77 becomes unnecessary. Moreover, the output of the above-mentioned multiplication circuit 78 minds the digitized output interface circuitry 79, and is the digital audio output signal DOUT. It can carry out and can also output from a terminal 80.

[0094] Moreover, when performing gain control in analog, the above-mentioned multiplication circuit 78 is sent to D/A converter 74, after the multiplication of 1 will be carried out as a multiplier to the digital audio data from the above-mentioned ATC decoder 73, if the digital audio data from the above-mentioned ATC decoder 73 are sent to direct D/A converter 74, without being prepared or the multiplication circuit 78 is formed. The analog signal from this D/A converter 74 is analog audio signal AOUT after being sent to the level control circuit 77 through the low pass filter 75 and performing gain control based on the control signal from said CPU90 in the level control circuit 77 concerned. It carries out and is outputted from an output terminal 76.

[0095]

[Effect of the Invention] As mentioned above, in case the record or transmission of a real signal which consists of two or more partial signals is performed according to the signal-processing approach of this invention, and equipment The maximal value of the signal level about each partial part is detected, and this maximal value is recorded or transmitted with the real signal. At the time of playback The maximum of that maximal value, Compare the maximal value of the

partial signal to reproduce, and when the maximal value of the partial signal to reproduce is smaller Since he is trying to reproduce the level of the partial signal together with the level of the maximum value part part signal automatically, the change of a regeneration level is attained effectively, a user not performing change actuation of the regeneration level for every partial signal, therefore mitigating a user's burden. Thereby, according to the signal-processing approach of this invention, and equipment, it becomes possible to a user to offer a more comfortable operating environment.

[0096] Moreover, since the maximal value of the signal level about each partial signal is recorded with the real signal according to the signal record medium of this invention, that maximal value can be used for the level control at the time of playback, therefore a user's change actuation of the regeneration level for every partial signal is unnecessary at the time of playback of this signal record medium, and it becomes possible to change a regeneration level effectively, mitigating a user's burden.

[Translation done.]

TECHNICAL FIELD

[Industrial Application] This invention relates digital signals, such as music and voice, to the signal record medium with which the signal processed by this signal-processing approach is recorded on record, the signal-processing approach at the time of transmitting or reproducing and its equipment, and a list.

[Translation done.]

PRIOR ART

[Description of the Prior Art] Conventionally, in case signals, such as music and voice, are recorded to archive media, such as the so-called compact disk (CD), (sound recording), the level of the sound recording usually differs separately. That is, in the compact disk of two or more sheets, the level of the signal recorded for every disk will differ.
[0003] for this reason, two or more sounds of two or more sheets reproduced from the compact disk (CD) etc. -- since the level of the signal reproduced from each compact disk as mentioned above differed when easy music etc. was recorded on the disk of one sheet in which for example, record playback is possible, in case the disk of one sheet which recorded two or more music concerned is played, a user needs to change a regeneration level for every music, or it is necessary to control

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[Translation done.]

EFFECT OF THE INVENTION

[Effect of the Invention] As mentioned above, in case the record or transmission of a real signal which consists of two or more partial signals is performed according to the signal-processing approach of this invention, and equipment The maximal value of the signal level about each partial part is detected, and this maximal value is recorded or transmitted with the real signal. At the time of playback The maximum of that maximal value, Compare the maximal value of the partial signal to reproduce, and when the maximal value of the partial signal to reproduce is smaller Since he is trying to reproduce the level of the partial signal together with the level of the maximum value part part signal automatically, the change of a regeneration level is attained effectively, a user not performing change actuation of the regeneration level for every partial signal, therefore mitigating a user's burden. Thereby, according to the signal-processing approach of this invention, and equipment, it becomes possible to a user to offer a more comfortable operating environment.
[0096] Moreover, since the maximal value of the signal level about each partial signal is recorded with the real signal according to the signal record medium of this invention, that maximal value can be used for the level control at the time of playback, therefore a user's change actuation of the regeneration level for every partial signal is unnecessary at the time of playback of this signal record medium, and it becomes possible to change a regeneration level effectively, mitigating a user's burden.

[Translation done.]

* NOTICES *

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] Namely, if it becomes common and states, when the music recorded on the inside of one record medium, voice, or the music and voice which were transmitted from one transmission medium are divided into some parts and the level recorded or transmitted for every part differs (for example, when divided for every music), it is necessary to change a regeneration level for every part in the case of the playback.
[0005] Therefore, at the time of playback, change actuation of level must be performed frequently, actuation becomes very complicated, and the burden of the user concerned is increasing the user.
[0006] Then, this invention is made in view of such the actual condition, even when reproducing the signal which was divided into two or more parts, and was recorded or transmitted, a user does not need to perform change actuation of a regeneration level frequently, but it aims at providing with a signal record medium the signal-processing approach which enables the change of a regeneration level effectively and equipment, and a list.

[Translation done.]

MEANS

[Means for Solving the Problem] This invention is proposed in order to attain the above-mentioned purpose, the signal-processing approach of this invention is the signal-processing approach of a real signal which consists of two or more partial signals, the maximal value of the signal level about each partial signal is detected, and it is characterized by recording or transmitting the above-mentioned maximal value with the above-mentioned real signal. Here, it should encode and the OR of the absolute value of the above-mentioned partial signal can be used for the real signal and the maximal value which are recorded or transmitted as approximate value of the above-mentioned maximal value.
[0008] Next, the signal record medium of this invention comes to record the signal processed by the signal-processing approach of above-mentioned this invention.
[0009] furthermore, by the signal-processing approach which reproduces the signal which was processed using the signal-processing approach of this invention, and was recorded or transmitted According to the above-mentioned record or the signal-processing approach at the time of transmission, playback of the real signal by which record or transmission was made is preceded. The maximum in the inside of the maximal value with which record or transmission of the signal level about each partial signal was made is detected, and it performs multiplying by the value which **(ed) the detected maximum concerned with the maximal value of each partial signal for every partial signal at the time of playback of a real signal. Moreover, when the maximal value with which record or transmission was made is encoded, in advance of playback of a real signal, the maximal value by which coding was carried out [above-mentioned] is decrypted, the maximum in the inside of each decrypted maximal value concerned is detected, and it performs multiplying by the value which **(ed) the maximum with the maximal value of each partial signal for every partial signal at the time of playback of a real signal. Furthermore, in advance of playback of the encoded real signal, the maximum in the inside of the maximal value with which record or transmission of the signal level about each partial signal was made is detected, and it multiplies by the value which **(ed) the detected maximum concerned with the maximal value of each partial signal for each [which was decrypted at the time of playback of a real signal] partial signal of every. Furthermore, when both a real signal and the maximal value are encoded In advance of playback of the encoded real signal, the encoded maximal value with which record or transmission of the signal level about a partial signal was made is decrypted. The maximum in the inside of each decrypted maximal value concerned is detected, and it performs multiplying by the value which **(ed) the detected maximum concerned with the maximal value of each partial signal for each [which was decrypted at the time of playback of a real signal] partial signal of every.
[0010] Furthermore, by the signal-processing approach of this invention, a bit shift can be used as the multiplication concerned, using the value of the exponentiation of 2 as approximate value of the multiplier by which each above-mentioned partial signal is multiplied.
[0011] Next, the signal processor of this invention is a signal processor of a real signal which consists of two or more partial signals, has a detection means to detect the maximal value of the signal level about each partial signal of a real signal, and is characterized by recording or transmitting the above-mentioned maximal value with the above-mentioned real signal. The real

signal and the maximal value which are recorded or transmitted also with the signal processor of this invention should be encoded. Moreover, the OR of the absolute value of each above-mentioned partial signal can be used as approximate value of the above-mentioned maximal value.
[0012] Furthermore, the signal processor which reproduces the signal which was processed using the signal-processing approach of this invention, and was recorded or transmitted A detection means to detect the maximum in the inside of the maximal value with which record or transmission of the signal level about each partial signal was made in advance of playback of the real signal by which record or transmission was made, It has the multiplication means which multiplies by the value which **(ed) the detected maximum concerned with the maximal value of each partial signal for every partial signal at the time of playback of a real signal. A detection means when the maximal value recorded or transmitted is encoded by ** detects the maximum in the inside of each of that maximal value, after decrypting the maximal value by which the signal level about each partial signal was encoded. Moreover, it multiplies by the multiplication means when the real signal recorded or transmitted is encoded for each [which decrypted the value which **(ed) maximum detected with the detection means with the maximal value of each partial signal at the time of playback of a real signal] partial signal of every. Furthermore, when both a real signal and the maximal value are encoded, the encoded maximal value with which record or transmission was made in the detection means is decrypted, the maximum in the inside of each decrypted maximal value concerned is detected, and it multiplies by the value which ** (ed) the detected maximum concerned with the maximal value of each partial signal in the multiplication means for each [which was decrypted at the time of playback of a real signal] partial signal of every.
[0013] Also in the signal processor of this invention, a bit shift can be used as the multiplication concerned, using the value of the exponentiation of 2 as approximate value of the multiplier by which each above-mentioned partial signal is multiplied.
[0014] Moreover, the signal processor of this invention which reproduces the signal which was processed using the signal-processing approach of this invention, and was recorded or transmitted Playback of the real signal which can also control a regeneration level in analog for example, by which record or transmission was made is preceded. It has the control means to which the maximal value with which record or transmission of the signal level about each partial signal was made is supplied. The control means concerned The maximum in the inside of the above-mentioned maximal value is detected, and a regeneration level is controlled in analog for every partial signal according to the maximal value and maximum of each partial signal at the time of playback of a real signal. Moreover, a detection means to detect the maximal value with which record or transmission of the signal level about each partial signal was made, and the maximum in the inside of each maximal value concerned to this signal processor that controls a regeneration level in analog can be established, and a regeneration level can also be controlled by the control means in analog for every partial signal according to the maximal value and maximum of each partial signal which were detected with the above-mentioned detection means at the time of playback of a real signal.
[0015] furthermore, when the maximal value with which record or transmission is made is encoded in the signal processor of this invention which controls a regeneration level in analog This encoded maximal value is supplied to a control means. The control means concerned The above-mentioned maximal value is decrypted, the maximum in the inside of each decrypted maximal value concerned is detected, and what controls a regeneration level in analog for every partial signal at the time of playback of a real signal is considered according to the maximal value and maximum of each partial signal. Furthermore, the encoded maximal value is also being able to decrypt with a decryption means and detecting the maximum in the inside of each maximal value concerned from the output of the decryption means concerned with a detection means further, before ******(ing) to a control means today, and a control means controls a regeneration level in analog for every partial signal according to this maximal value and maximum that were detected at the time of playback of a real signal.

[Translation done.]

OPERATION

[Function] In case the record or transmission of a real signal which consists of two or more partial partial signals is performed according to the signal-processing approach of this invention, and equipment The maximal value of the signal level about each partial signal is detected, and this maximal value is recorded or transmitted with the real signal. At the time of playback The maximum of that maximal value, The maximal value of the partial signal to reproduce is compared, and when the maximal value of the partial signal to reproduce is smaller, he is trying to reproduce the level of the part together with the level of the maximum value part part signal automatically.
[0017] Moreover, according to the signal record medium of this invention, since the maximal value of the signal level about each partial signal is recorded with the real signal, the maximal value can be used for the level control at the time of playback.

[Translation done.]

EXAMPLE

[Example] Hereafter, the desirable example of this invention is explained, referring to a drawing.
[0019] Drawing 1 is a flow chart which shows the explanation of operation at the time of performing the record or transmission of a signal in the signal processor with which the signal-processing approach of this invention is applied. From step S2 of this drawing 1 to step S9 expresses down stream processing of actuation of an important section.
[0020] In this drawing 1 , the time series sample data of voice or music is inputted as a real signal at the first step S1. The terminal input from the thing read in the record medium or another equipment etc. may be used for the input of a signal here, and especially the approach of the input concerned cannot be limited but can apply various approaches.
[0021] The index with which the sample data of the time series by which the input was carried out [above-mentioned] expresses with the following step S2 whether it is what is contained in the part of what position of the whole judges whether it changed with the time of a front sample. In addition, this index can be considered to be the same thing as the index of Q data format of said compact disk, therefore can mention digital signals, such as musical music, as an example as the above-mentioned part. Moreover, especially limitation of in what kind of form the index concerned is inputted like the case of the above-mentioned time series sample data is not performed. In this step S2, when it judges with not changing to the following step S3 again when it judges with the above-mentioned index changing (yes) (no), it progresses to step S6.
[0022] At step S3, a current index judges whether it is "1", when it judges with it being "1" (yes), it progresses to step S6, and when it judges with it not being "1" (no), it progresses to step S4.
[0023] In step S4, the maximal value of each sample data corresponding to the index in front of current one, i.e., a partial signal, is outputted, and it progresses to the following step S5. In the step S5 concerned, the zero clear of the maximal value memorized previously is carried out, and it progresses to step S6.
[0024] At the following step S6, the maximal value is larger, or as compared with the absolute value of input sample data, in being equal (yes), it progresses to step S8, and the maximal value memorized is progressed to step S7, when the maximal value is conversely smaller (no).
[0025] At step S7, the absolute value of the above-mentioned input sample data is substituted for the maximal value, and it progresses to step S8. In addition, although it is not smaller than the absolute value of input sample data, you may make it substitute the approximate value which is a near value instead of substituting the absolute value of input sample data for the maximal value here.
[0026] At the following step S8, input sample data is copied to an input sample buffer, and it progresses to the following step S9.
[0027] In this step S9, when it judges with it not being equal to the following step S10 when it judges whether it is equal to measurement size n beforehand set up for coding of the measurement size stored in the above-mentioned input sample buffer and judges with it being equal (yes) (no), it returns to step S1.
[0028] At step S10, it encodes using each sample data of the above-mentioned measurement size n stored in the above-mentioned input sample buffer, and progresses to the following step

S11. It is also possible to use compression coding which may carry out to Above n changing by the approach of coding and encoding it at a time one sample as n= 1 here, and may carry out to encoding the block which makes n plurality and consists of two or more of these samples, for example, is mentioned later. or [moreover, / omitting the above-mentioned step S8 and step S9 in this case by the ability also direct-recording or also transmitting / not encoding step S10, but / input sample data] -- or it does not omit -- what is necessary is just to make it consider n= 1, if it becomes In addition, although this example has described the example which encodes, it is also considered that it is made not to encode, either as mentioned above, and it does not limit especially about whether the approach of coding and coding are performed here. In not encoding, in case it outputs a signal in step S12 mentioned later, the direct output of an input signal, i.e., the real signal, will be carried out.
[0029] At the next step S11 of the above-mentioned step S10, all the data in the used input sample buffer are transposed to 0, and it progresses to the following step S12. In the step S12 concerned, the encoded signal is outputted and processing is ended after that. In addition, naturally this step S12 will be skipped, when the above-mentioned step S8 and step S9 are omitted.
[0030] Next, the configuration of the important section at the time of performing record or transmission to drawing 2 in the signal processor of this invention example with which the signal-processing approach of this invention is applied is shown.
[0031] In this drawing 2 , the absolute value calculation circuit 201 computes the absolute value of the time series sample data which is the real signal supplied from the terminal 200, and performs processing which sends this absolute value to the maximal value judging circuit 208 of the maximal value setting section 207 with the sample data by which the input was carried out [above-mentioned].
[0032] Moreover, the data of the index with which the sample data by which the input was carried out [above-mentioned] expresses whether it is the signal included in which part of the whole are supplied to the index judging circuit 203 through a terminal 202, and if the index concerned has changed with the index in front of one, processing which sends the index to the maximal value coding network 204 will be performed in the index judging circuit 203 concerned.
[0033] In the maximal value coding network 204 concerned, the maximal value to the above-mentioned index is detected from the input sample data from the above-mentioned terminal 200, the supplied maximal value is encoded, this is outputted, and this is sent to the maximal value output circuit 205. In addition, although what has various normalization multipliers used in case the thing which uses the number of bits of the maximal value, for example as a sign, or input sample data is encoded as the approach of coding in this maximal value coding network 204 can be considered, especially limitation is not performed here. Moreover, since coding of the maximal value concerned is not indispensable conditions in this invention, it is good also as what is not performed. The flow chart of drawing 1 mentioned above shows the example which does not perform the coding concerned.
[0034] In the next maximal value output circuit 205, while outputting the maximal value obtained by processing of each sample data corresponding to the index in front of one, i.e., a partial signal, through a terminal 217, the recognition signal which shows the purport which outputted the maximal value is sent to the maximal value zero-clear circuit 206.
[0035] In the maximal value zero-clear circuit 206 concerned, while carrying out the zero clear of the memory currently used for storage of the maximal value according to the above-mentioned recognition signal, the recognition signal which shows the purport concerned which carried out the zero clear to the above-mentioned maximal value judging circuit 208 of the maximal value setting section 207 is sent.
[0036] In the above-mentioned maximal value judging circuit 208, the maximal value obtained by processing to each sample data corresponding to the index in front of one and the absolute value output from said absolute value calculation circuit 201 are measured, and when the above-mentioned maximal value is larger, the time series sample data itself sent from the above-mentioned absolute value calculation circuit 201 is sent to the input sample buffer 211 of the signal coding section 210. On the contrary, when the absolute value of this sample data is larger,

it not only sends the above-mentioned time series sample data to the above-mentioned input sample buffer 211, but it sends the absolute value concerned to the maximal value substitution circuit 209.
[0037] The inputted absolute value concerned is substituted for the maximal value substitution circuit 209 concerned to the memory allocated to the maximal value.
[0038] Although the above-mentioned maximal value judging circuit 207 and the maximal value substitution circuit 209 constitute the maximal value setting section 207 which sets up the maximal value, they may be made to take the OR of the absolute value output of the above-mentioned absolute value calculation circuit 201 instead of these processings, and to output as approximate value of the maximal value of this partial signal.
[0039] In the following signal coding section 210, the data of the measurement size stored in the above-mentioned input sample buffer 211 are sent to the measurement size judging circuit 212, and it judges whether the several n sample data beforehand set up for coding is stored in the measurement size judging circuit 212 concerned. In this measurement size judging circuit 212, when it judges with the measurement size stored in the above-mentioned input sample buffer 211 not fulfilling required measurement size n, the recognition signal which shows that is sent to the absolute value calculation circuit 201, and processing which this mentioned above about a new input sample is performed. Moreover, in the measurement size judging circuit 212, when it judges with the measurement size required for the input sample buffer 211 having been stored, the recognition signal which shows that from the measurement size judging circuit 212 concerned to the signal coding network 213 is sent.
[0040] In the signal coding network 213 concerned, after it will encode the sample data of the above-mentioned measurement size n supplied from the above-mentioned input sample buffer 211 if the recognition signal concerned is supplied, and delivery and these processings end the encoded sample data concerned to the signal output circuit 215, the recognition signal which shows that is sent to the sample buffer zero-clear circuit 214.
[0041] In the above-mentioned sample buffer zero-clear circuit 214, supply of the recognition signal which shows termination of the above-mentioned processing from the above-mentioned signal coding network 213 carries out the zero clear of the above-mentioned input sample buffer 211.
[0042] Although the signal coding section 210 consists of the above-mentioned input sample buffer 211, a measurement size judging circuit 212, a signal coding network 213, and a sample buffer zero-clear circuit 214, when not encoding sample data, there is no need and, as for these components, the output of the maximal value judging circuit 208 will be sent to the direct signal output circuit 215.
[0043] In the above-mentioned signal output circuit 215, the supplied sample data (when not encoding, it is the sample data concerned itself which is not encoded) which was encoded is outputted to external terminal 216 grade, and processing is ended.
[0044] Next, drawing 3 is a flow chart which shows the actuation at the time of reproducing a signal in the signal processor of this invention. From step S21 of this drawing 3 to the step S39 shows down stream processing of playback actuation.
[0045] In this drawing 3 , as initialization, the maximum and the index of the maximal value are set to 0, and it progresses to the following step S22 at step S21.
[0046] At the step S22 concerned, said encoded maximal value corresponding to current each sample data, i.e., partial signal, of an index reproduced or transmitted, for example from the record medium is inputted, and it progresses to the following step S23. At this step S23, the maximal value by which coding was carried out [above-mentioned] is decrypted, and it progresses to the following step S24. In addition, about the approach of coding here and a decryption, especially limitation is not performed like the time of actuation of the record mentioned above or transmission. Moreover, when it is data with which the inputted maximal value is not encoded, the above-mentioned step S23 is skipped.
[0047] At step S24, as compared with the maximum of the maximal value till then, when the decrypted maximal value concerned is larger than the above-mentioned maximum (yes), it progresses to the following step S25, and the maximal value (when coding is not performed, it is

the maximal value concerned itself which is not encoded) by which the decryption was carried out [above-mentioned] is progressed to step S26, when the maximum is conversely larger (no).

[0048] At the above-mentioned step S25, the above-mentioned maximum is transposed to the decrypted maximal value concerned, and it progresses to the following step S26. At the step S26 concerned, when judging whether the above-mentioned processing was completed and having ended about no indexes (no), after moving to the following index at step S27, it returns to step S22. On the contrary, in step S26, when it is judged that the above-mentioned processing is completed about all indexes (yes), it progresses to the following step S28.
[0049] In the signal processor of this example, the maximum of the maximal value about all the partial signals of the regenerative signal (real signal) with which playback is made in step S28 from the above step S21 is calculated.
[0050] Next, at step S28, the index for playback is anew set to 0, and it progresses to the following step S29. At this step S29, it progresses to step S30, after inputting the maximal value by which coding of the partial signal corresponding to a current index was carried out [above-mentioned]. The encoded maximal value concerned is decrypted at this step S30. In addition, when the maximal value is encoded as mentioned above and it is not recorded or transmitted, this step S30 is skipped.
[0051] At the following step S31, when processing is completed at said step S26, the value p which broke the maximum already calculated by the maximal value asked at step S29 is calculated, and it progresses to step S32 after that.
[0052] At step S32, the sample data which coding was carried out, and was recorded or transmitted [above-mentioned] is inputted, and it progresses to step S33. At this step S33, it judges whether it was carried out by n sample required for a decryption, and when [concerned] it judges with the input for n sample yet not being completed (no), it progresses to step S32, and the input concerned progresses to the following step S34, when it judges with having ended (yes), return and.
[0053] At this step S34, the n above-mentioned sample data are decrypted and it progresses to the following step S35. In addition, since step S32 to the step S34 is the process which is needed when a signal is encoded and it is recorded or transmitted, when record or transmission is performed in the form [being inputted without encoding a signal], it is skipped.
[0054] At the following step S35, it progresses to step S36, after multiplying each sample data decoded in step S34 by p. At this step S36, n sample data which multiplied by p in the above-mentioned step S35 are outputted, and it progresses to step S37.
[0055] At this step S37, when it judges with whether the value of the index corresponding to the following sample is changing, and it not judging and changing (no), it returns to step S32, and when a decryption of a signal is continued and it judges that it was changing further (yes), it progresses to step S38.
[0056] At the step S38 concerned, when it judges with judging whether the above-mentioned processing about the partial signal corresponding to all indexes was completed, and having not ended (no), after progressing to the following step S39 and carrying out 1 **** of the values of an index at the step S39 concerned, it returns to step S29. On the other hand, when it judges with processing having been completed at step S38 (yes), processing of signal regeneration is ended.
[0057] Next, the configuration which performs the above-mentioned playback of the signal processor which used the signal-processing approach of this invention to drawing 4 is shown.
[0058] In this drawing 4 , the maximal value which was detected by the signal processor of said this invention example, and was encoded on the occasion of record or transmission is inputted through terminal 240 grade, a decryption of the encoded maximal value concerned about the partial signal corresponding to all indexes is made here, and it is sent to that posterior pole large value buffer 243 in the maximal value decryption circuit 242 of the maximum setting section 241. In addition, when the maximal value concerned is not encoded as mentioned above on the occasion of record of the maximal value, or transmission, the maximal value decryption circuit 242 concerned will be omitted, and the maximal value which was not encoded will be directly

sent to the maximal value buffer 243.
[0059] In the next maximum detector 244, the maximum of all the maximal value stored in the above-mentioned maximal value buffer 243 is detected, and the maximum concerned is sent to the multiplier decision circuit 247. In addition, you may make it replace with the ability to search for the OR of all the maximal value as approximate value of the maximum concerned instead of calculating the above-mentioned maximum directly, when there is constraint of a hardware scale etc. here.
[0060] Next, in the above-mentioned multiplier decision circuit 247, the multiplier over each sample data of the partial signal corresponding to the index concerned is computed by **(ing) supply ****** maximum from the above-mentioned maximum detector 244 with the maximal value to which it corresponds in the maximal value buffer 243 corresponding to the index inputted through the terminal 245 grade. In addition, the number of the exponentiations of 2 is adopted as approximate value of the multiplier concerned here, and it may be made to realize the multiplication to each sample data by carrying out the bit shift of each sample data concerned.
[0061] Moreover, the reproduced signal (sample data) is supplied to a terminal 246, and this is savings ** to the input sample buffer 249 of the signal decryption section 248. In the next measurement size judging circuit 250, it judges whether the measurement size required for a decryption was stored to the above-mentioned input sample buffer 249. When it judges with the measurement size required for the above-mentioned decryption having been stored in the above-mentioned input sample buffer 249 in the measurement size judging circuit 250 concerned, the sample data currently stored in the above-mentioned input sample buffer 249 is sent to the next signal decryption circuit 251, and is decoded here. The time series sample data which might get twisted in the decryption of this signal decryption circuit 251 is sent to the time series sample multiplication circuit 252.
[0062] In addition, when coding of a signal is not performed as mentioned above, the signal decryption section 248 which consists of the above-mentioned input sample buffer 249, a measurement size judging circuit 250, and a signal decryption circuit 251 will be omitted, and the playback input signal from a terminal 246 will be sent to the direct time series sample multiplication circuit 252. Moreover, although the case where fixed numbers block this example a sample every, and it encodes also about coding and the decryption approach of a signal is mentioned as the example, the approach of encoding using non-blocking operations, such as a filter, may be adopted, and especially limitation is not performed. Furthermore, the input terminal into which the above-mentioned maximal value, an index, and an input signal are inputted may be made to perform this with one or more terminals.
[0063] In the time series sample multiplication circuit 252, the multiplication of the multiplier from the above-mentioned multiplier decision circuit 247 and the time series sample data from the signal decryption circuit 251 is performed, and the time series sample data (time series sample data to which the multiplication of the above-mentioned multiplier was carried out) of the result is outputted to the signal output circuit 253. In addition, when the exponentiation of 2 is adopted as a multiplier as mentioned above, a bit shift can perform the multiplication in the above-mentioned time series sample multiplication circuit 252.
[0064] In the above-mentioned signal output circuit 253, the time series sample data to which the above-mentioned multiplication was performed is outputted to terminal 254 grade, and processing is ended.
[0065] Next, in drawing 3 and drawing 4 which were mentioned above, although gain of a regenerative signal is controlled in digital one, this invention is included, also when performing processing same in analog.
[0066] The flow chart which explains the actuation in the case of controlling the level of a regenerative signal in analog by the signal-processing approach of this invention to drawing 5 is shown. Actuation from step S51 of this drawing 5 to step S65 shows each process of operation of controlling signal level in analog. Moreover, step S61 ** detects the greatest thing in the maximal value about each partial signal similarly from step S51 with step S21 to the step S31 of said drawing 3 , and since it is what calculates the value which **(ed) this maximum with the maximal value of each partial signal, the explanation is omitted here.

[0067] In this drawing 5 , level is controlled in analog at step S62 according to the value acquired at the same step S61 as step S31 of said drawing 3 . In this case, since it has the effectiveness same with multiplying by p in digital ones, processing which adjusts reproductive level in the configuration of the analog circuit after digital ones / analog (D/A) conversion is performed.
[0068] In addition, although the configuration of moving the contact of variable resistance automatically according to the value of Above p can be considered while controlling the attenuation of a signal by variable resistance in amplifier in order to realize step S62 concretely as a configuration here for example, especially limitation is not performed here.
[0069] At the following step S63, when it judges with whether the index of the partial signal which is carrying out current playback is changing, and it judging and changing (yes), it progresses to the following step S64. On the contrary, the same actuation is repeated until return changes to the same step S63 and then an index changes, when it judges with not changing in the step S63 concerned (no).
[0070] At step S64, when it judges with judging whether the processing about the partial signal of all indexes was completed, and having not ended (no), it progresses to step S65. In this step S65, it moves to the following index and the processing from the above-mentioned step S59 is repeated. On the other hand, when it judges with processing being completed about the partial signal of all indexes at step S64 (yes), processing of the analog-level control of this drawing 5 is ended.
[0071] It becomes possible to change a regeneration level effectively, losing change actuation of the regeneration level for every partial signal by the user at the time of playback, and mitigating a user's burden, in case the real signal which consists of two or more partial signals recorded or transmitted in the signal-processing approach of this invention and equipment is reproduced, since it seems that it mentioned above.
[0072] Next, compression coding of the digital audio signal is carried out as one example in which the signal processor which realizes the signal-processing approach of this invention mentioned above is applied to drawing 6 , it records on a record medium, and the outline configuration of the compressed data record regenerative apparatus which carries out the expanding decryption of the signal reproduced from the record medium is shown.
[0073] In this drawing 6 , control of a setup of the maximal value, the gain control of a regenerative signal, etc. in the signal-processing approach of this example mentioned above is performed by the central processing unit (CPU) 90, and coding processing in said maximal value coding network 204 or the signal coding section 210 is further performed for said maximal value decryption circuit 241, decryption processing in the signal decryption section 248, etc. by the decoder 73 in an encoder 63. In addition, about coding and a decryption of the maximal value, it can carry out not in an encoder 63 and the decoder 73 but in the above CPU 90. Furthermore, in the multiplication circuit 78, analog-gain control (gain accommodation) is performed for said digital gain control (gain accommodation) corresponding to said time series sample multiplication circuit 252 in the level control circuit 77.
[0074] In the compressed data record regenerative apparatus 9 shown in this drawing 6 , the magneto-optic disk 1 by which a rotation drive is carried out with a spindle motor 51 is first used as a record medium. In addition, a diameter can use the so-called mini disc (MD) named generically as a magneto-optic disk which is 64mm for this magneto-optic disk 1. At the time of record of the data to this magneto-optic disk 1, by impressing the modulation field according to record data by the magnetic head 54, where a laser beam is irradiated by the optical head 53, the so-called field modulation record is performed and data are recorded along the recording track of a magneto-optic disk 1. Moreover, at the time of playback, the recording track of above-mentioned optical MAG DISUSUKU 1 is traced by the laser beam by the optical head 53, and it reproduces in magneto-optics.
[0075] The optical head 53 consists of photodetectors which have the light sensing portion of optics, such as laser light sources, such as a laser diode, a collimator lens, an objective lens, a polarization beam splitter, and a cylindrical lens, and a predetermined pattern. This optical head 53 is formed in the above-mentioned magnetic head 54 and the location which counters through the magneto-optic disk 1. When recording data on a magneto-optic disk 1, while driving the

magnetic head 54 by the head drive circuit 66 of the recording system mentioned later and impressing the modulation field according to record data, a field modulation technique performs heat magnetic recording by irradiating a laser beam on the purpose truck of a magneto-optic disk 1 by the optical head 53. Moreover, this optical head 53 detects the reflected light of the laser beam which irradiated the purpose truck, detects a focal error by the so-called astigmatism method, for example, detects a tracking error by the so-called push pull method. When reproducing data from a magneto-optic disk 1, the optical head 53 detects the difference in the polarization angle (car angle of rotation) of the reflected light from the purpose truck of a laser beam, and generates a regenerative signal at the same time it detects the above-mentioned focal error and a tracking error.

[0076] The output of the optical head 53 is supplied to the RF circuit 55. This RF circuit 55 is supplied to the decoder 71 of the reversion system which makes a regenerative signal binary and mentions it later while it extracts the above-mentioned focal error signal and a tracking error signal from the output of the optical head 53 and supplies them to the servo control circuit 56.

[0077] The servo control circuit 56 consists of for example, a focus servo control circuit, a tracking servo control circuit, a spindle motor servo control circuit, a thread servo control circuit, etc. The above-mentioned focus servo control circuit performs focal control of the optical system of the optical head 53 so that the above-mentioned focal error signal may become zero. Moreover, the above-mentioned tracking servo control circuit performs tracking control of the optical system of the optical head 53 so that the above-mentioned tracking error signal may become zero. Furthermore, the above-mentioned spindle motor servo control circuit controls a spindle motor 51 to carry out the rotation drive of the magneto-optic disk 1 with a predetermined rotational speed (for example, constant linear velocity). Moreover, the above-mentioned thread servo control circuit moves the optical head 53 and the magnetic head 54 to the purpose truck location of a magneto-optic disk 1 specified by the system controller 57. The servo control circuit 56 which performs such various control action sends the information which shows the operating state of each part controlled by this servo control circuit 56 to a system controller 57.

[0078] The key input control unit 58 and the display 59 are connected to the system controller 57. This system controller 57 performs control of a recording system and a reversion system by the mode of operation specified by the actuation input by the key input control unit 58. Moreover, a system controller 7 manages the record location and playback location on the above-mentioned recording track which the optical head 53 and the magnetic head 54 are tracing based on the address information of the sector unit reproduced with a header time, Q data of a sub-code, etc. from the recording track of a magneto-optic disk 1. Furthermore, a system controller 57 performs control to which playback time amount is displayed on a display 59 based on a data compression rate and the playback positional information on the above-mentioned recording track. In addition, the system controller 57 concerned can perform processing by said CPU90, and does not need to form said CPU90 in this case.

[0079] By carrying out the multiplication of the inverse number (for example, the time of 1/4 compression 4) of a data compression rate to the address information (absolute time information) of the sector unit reproduced from the recording track of a magneto-optic disk 1 with the so-called header time, the so-called sub-code Q data, etc., the above-mentioned playback time amount display searches for an actual hour entry, and displays this on a display 59. In addition, when absolute time information is beforehand recorded, for example on recording tracks, such as a magneto-optic disk, at the time of record (preformatted), it is also possible to display the current position by actual chart lasting time by reading this preformatted absolute time information and carrying out the multiplication of the inverse number of a data compression rate.

[0080] Next, in the recording system of the record playback machine of this disk record regenerative apparatus, the analog audio input signal AIN from an input terminal 60 is supplied to A/D converter 62 through a low pass filter 61. This A/D converter 62 quantizes the above-mentioned analog audio input signal AIN. The digital audio signal obtained from A/D converter 62 is supplied to the ATC(Adaptive Transform Coding) PCM encoder 63. Moreover, the digital audio

signal of above-mentioned A/D converter 62 is sent also to said CPU90. CPU90 at this time generates said index from the digital audio signal concerned, and sends it to the above-mentioned ATC encoder 63.
[0081] On the other hand, the digital audio input signal DIN which contains an index in an input terminal 67 at least from other record regenerative apparatus of these is supplied, and this input signal DIN is supplied to the ATC encoder 63 and the above CPU 90 through the digital input interface circuitry 68. CPU90 concerned at this time processes a setup of the maximal value corresponding to the signal-processing approach at the time of record of this invention mentioned above using the above-mentioned index and the digital audio signal etc., and sends the obtained data to the above-mentioned ATC encoder 63.
[0082] An encoder 63 also performs coding of said maximal value, and sends these to memory 64 while it performs bit compression (data compression) processing to the time series sample data supplied through digital audio PCM data and the digital input interface circuitry 68 of a predetermined transfer rate which quantized the above-mentioned input signal AIN with above-mentioned A/D converter 62. In addition, in the data compression in the above-mentioned encoder 63, although the compressibility concerned is explained as 4 times, this example has this scale factor with the configuration for which it does not depend, and can be chosen as arbitration by the application.
[0083] Next, writing and read-out of data are controlled by the system controller 57, and memorize temporarily the ATC data supplied from the ATC encoder 63, and memory 64 is used as buffer memory for recording on a disk if needed. That is, the compression audio data by which high efficiency coding was made by the ATC encoder 63 are reduced 1/4 of the data transfer rate (75 sectors / second) of a CD-DA format with that standard data transfer rate, i.e., 18.75 sectors / second, for example, and this compressed data is continuously written in memory 14. If 1 sector per 4 sectors is recorded when being compressed 4 times, as mentioned above, it is sufficient for this compressed data (ATC data), but since such record of every 4 sectors is next to impossible as a matter of fact, it is made to record sector continuation which is mentioned later. This record is burstily performed through an idle period with the same data transfer rate (75 sectors / second) as a standard CD-DA format by making into a record unit the cluster which consists of predetermined two or more sectors (for example, 32 sector + number sector). That is, in the memory 14 concerned, the ATC audio data continuously written in with the low transfer rate of the 18.75 (= 75/4) sectors / second according to the above-mentioned bit compression rate are burstily read with the transfer rate of the above-mentioned 75 sectors / second as record data. the instant-data transfer rate within the time amount of the record actuation burstily performed although the overall data transfer rate containing a record idle period is the low rate of the above-mentioned 18.75 sectors / second about this data read and recorded -- the above -- standard 75 sectors / second have come. Therefore, when it is the same rate (constant linear velocity) as the CD-DA format with a standard disk rotational speed, record of the same recording density as a year worth CD-DA format and a storage pattern will be performed.
[0084] record data burstily read from the above-mentioned memory 64 with the transfer rate (an instant ---like) of the above-mentioned 75 sectors / second, such as ATC audio data, are supplied to an encoder 65. Here, the unit by which continuation record is carried out by one record in the data stream supplied to an encoder 65 from the above-mentioned memory 64 is made into the number sector for cluster connection allotted to this cluster [which consists of two or more sectors (for example, 32 sectors)], and cluster order location. This sector for cluster connection is set up for a long time than the interleave length in an encoder 65, and even if it interleaves, he is trying not to affect the data of other clusters.
[0085] An encoder 65 performs coding processing (parity addition and interleave processing), EFM coding processing, etc. for an error correction about the record data burstily supplied as mentioned above from memory 64. The record data with which coding processing by this encoder 65 was performed are supplied to the magnetic-head drive circuit 66. The magnetic head 54 is connected, and this magnetic-head drive circuit 66 drives the magnetic head 54 so that the modulation field according to the above-mentioned record data may be impressed to a magneto-

optic disk 1.
[0086] Moreover, a system controller 57 controls a record location to record continuously the above-mentioned record data burstily read from memory 64 by this memory control on the recording track of a magneto-optic disk 1 while performing memory control like **** to memory 64. Control of this record location manages the record location of the above-mentioned record data burstily read from memory 64 by the system controller 57, and is performed by supplying the control signal which specifies the record location on the recording track of a magneto-optic disk 1 to the servo control circuit 56.
[0087] Next, the reversion system of this magneto-optic-disk record playback unit is explained. the playback output which this reversion system is for reproducing the record data continuously recorded by the above-mentioned recording system on the recording track of a magneto-optic disk 1, and is obtained by tracing the recording track of a magneto-optic disk 1 by the laser beam by the optical head 53 -- the RF circuit 55 -- binary -- it has the decoder 71-izing [the decoder] and supplied. At this time, not only a magneto-optic disk but read-out of the same optical disk only for playbacks as the so-called compact DIKUSU (CD:Compact Disc) can be performed.
[0088] Corresponding to the encoder 65 in an above-mentioned recording system, about the playback output made binary by the RF circuit 55, a decoder 71 processes decryption processing, EFM decryption processing, etc. like **** for an error correction, and reproduces audio data etc. with the transfer rate of 75 sectors / second earlier than the transfer rate of normal. The playback data obtained by this decoder 71 are supplied to memory 72.
[0089] Writing and read-out of data are controlled by the system controller 57, and memory 72 is written in at the transfer rate of 75 sectors / second of those burstily [the playback data supplied with the transfer rate of 75 sectors / second from a decoder 71]. Moreover, this memory 72 is read at the transfer rate 18.75 sector / second of 75 sectors / second of normal continuously [the above-mentioned playback data burstily written in with the transfer rate of the above-mentioned 75 sectors / second].
[0090] A system controller 57 performs memory control which reads the above-mentioned playback data from memory 72 continuously with the transfer rate of the above-mentioned 18.75 sectors / second while writing playback data in memory 72 with the transfer rate of 75 sectors / second. Moreover, a system controller 57 controls a playback location to reproduce continuously the above-mentioned playback data burstily written in by this memory control from memory 72 from the recording track of a magneto-optic disk 1 while performing memory control like **** to memory 72. Control of this playback location manages the playback location of the above-mentioned playback data burstily read from memory 72 by the system controller 57, and is performed by supplying the control signal which specifies the playback location on the recording track of a magneto-optic disk 1 or an optical disk 1 to the servo control circuit 56.
[0091] The ATC audio data obtained as playback data continuously read from the above-mentioned memory 72 with the transfer rate of 18.75 sectors / second are supplied to the ATC decoder 73. This ATC decoder 73 also performs a decryption of said encoded maximal value while reproducing 16-bit digital audio data by increasing the data elongation (bit elongation) of the ATC data of an audio 4 times. While the digital audio data from this ATC decoder 73 are sent to D/A converter 74 through the multiplication circuit 78, it is sent also to said CPU90 and the data of the above-mentioned maximal value and an index are also further sent to this CPU90.
[0092] CPU90 at this time processes multiplier decision corresponding to the signal-processing approach at the time of playback of this invention mentioned above using the above-mentioned index, the maximal value, and digital audio data etc., and sends the obtained data to the multiplication circuit 78 or the level control circuit 77. That is, in performing gain control to a regenerative signal in digital one, in performing a multiplier in the above-mentioned multiplication circuit 78 in [again] analog, it sends the control signal of variable resistance to it at the level control circuit 77.
[0093] Here, when performing gain control in digital one, the multiplication of the multiplier from the above CPU 90 is carried out in the above-mentioned multiplication circuit 78, and this digital data with which gain control was performed in digital one is sent to D/A converter 74. This D/A

converter 74 changes into an analog signal the digital audio data supplied from the ATC decoder 73. The output of this D/A converter 74 is analog audio signal AOUT to which the level control circuit 77 was passed as it was through the low pass filter 75, and gain control was performed in digital one. It carries out and is outputted from an output terminal 76. In addition, with the configuration which performs only this digital gain control, the level control circuit 77 becomes unnecessary. Moreover, the output of the above-mentioned multiplication circuit 78 minds the digitized output interface circuitry 79, and is the digital audio output signal DOUT. It can carry out and can also output from a terminal 80.

[0094] Moreover, when performing gain control in analog, the above-mentioned multiplication circuit 78 is sent to D/A converter 74, after the multiplication of 1 will be carried out as a multiplier to the digital audio data from the above-mentioned ATC decoder 73, if the digital audio data from the above-mentioned ATC decoder 73 are sent to direct D/A converter 74, without being prepared or the multiplication circuit 78 is formed. The analog signal from this D/A converter 74 is analog audio signal AOUT after being sent to the level control circuit 77 through the low pass filter 75 and performing gain control based on the control signal from said CPU90 in the level control circuit 77 concerned. It carries out and is outputted from an output terminal 76.

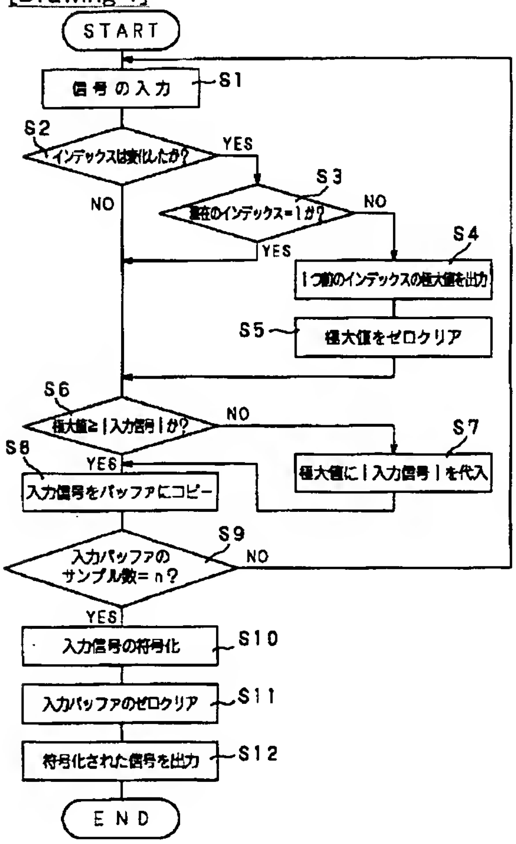
[Translation done.]

DESCRIPTION OF DRAWINGS

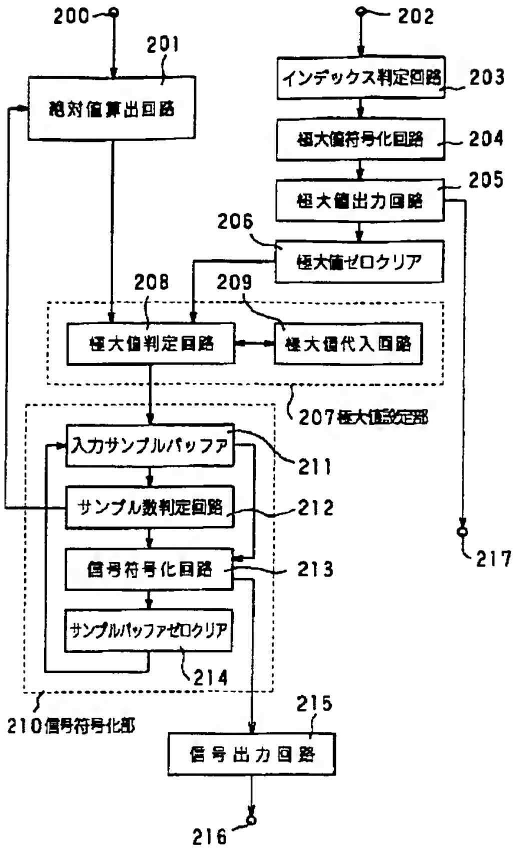
[Brief Description of the Drawings]
[Drawing 1] It is a flow chart showing the outline of the actuation at the time of performing record or transmission of a signal by the signal-processing approach of this invention.
[Drawing 2] It is the block circuit diagram showing the configuration of the important section of the signal processor of this invention example which performs record or transmission of a signal by this invention signal-processing approach.
[Drawing 3] It is the flow chart with which the outline of the actuation at the time of reproducing a signal by this invention signal-processing approach is expressed, and the flow of actuation in the case of controlling a regeneration level in digital one especially is expressed.
[Drawing 4] It is the block circuit diagram showing the configuration of the important section of the signal processor of this invention example which reproduces a signal by this invention signal-processing approach.
[Drawing 5] It is the flow chart with which the outline of the actuation at the time of reproducing a signal by the signal-processing approach by this invention is expressed, and the flow of actuation in the case of controlling a regeneration level in analog especially is expressed.
[Drawing 6] It is the block circuit diagram showing the configuration of the compressed data record regenerative apparatus of the digital audio signal as one example in which the signal processor of this invention example is applied.
[Description of Notations]
201 Absolute Value Calculation Circuit
203 Index Judging Circuit
204 Maximal Value Coding Network
205 Maximum Output Circuit
206 Maximal Value Zero-Clear Circuit
207 Maximal Value Setting Section
208 Maximal Value Judging Circuit
209 Maximal Value Substitution Circuit
210 Signal Coding Section
211,249 Input sample buffer
212,250 Measurement size judging circuit
213 Signal Coding Network
214 Sample Buffer Zero-Clear Circuit
215,253 Signal output circuit
242 Maximal Value Decryption Circuit
243 Maximal Value Buffer
244 Maximal Value Detector
247 Multiplier Decision Circuit
248 Signal Decryption Section
251 Signal Decryption Circuit
252 Time Series Sample Multiplication Circuit

DRAWINGS

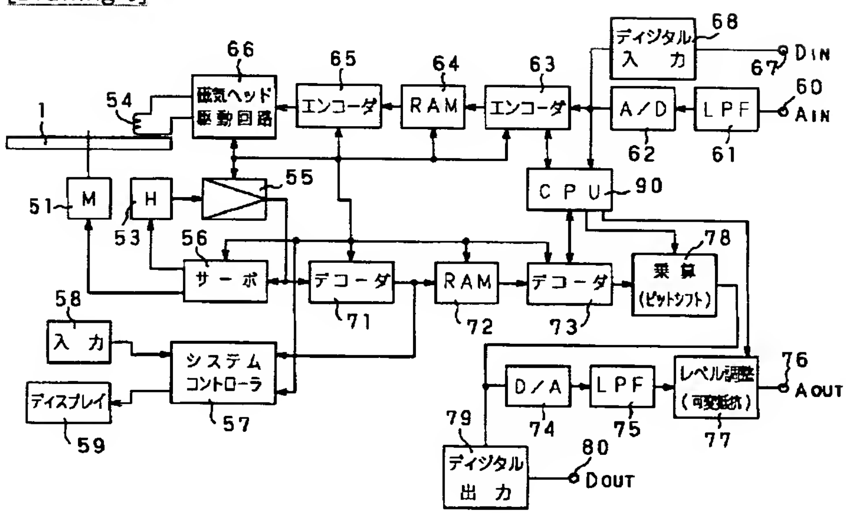
[Drawing 1]



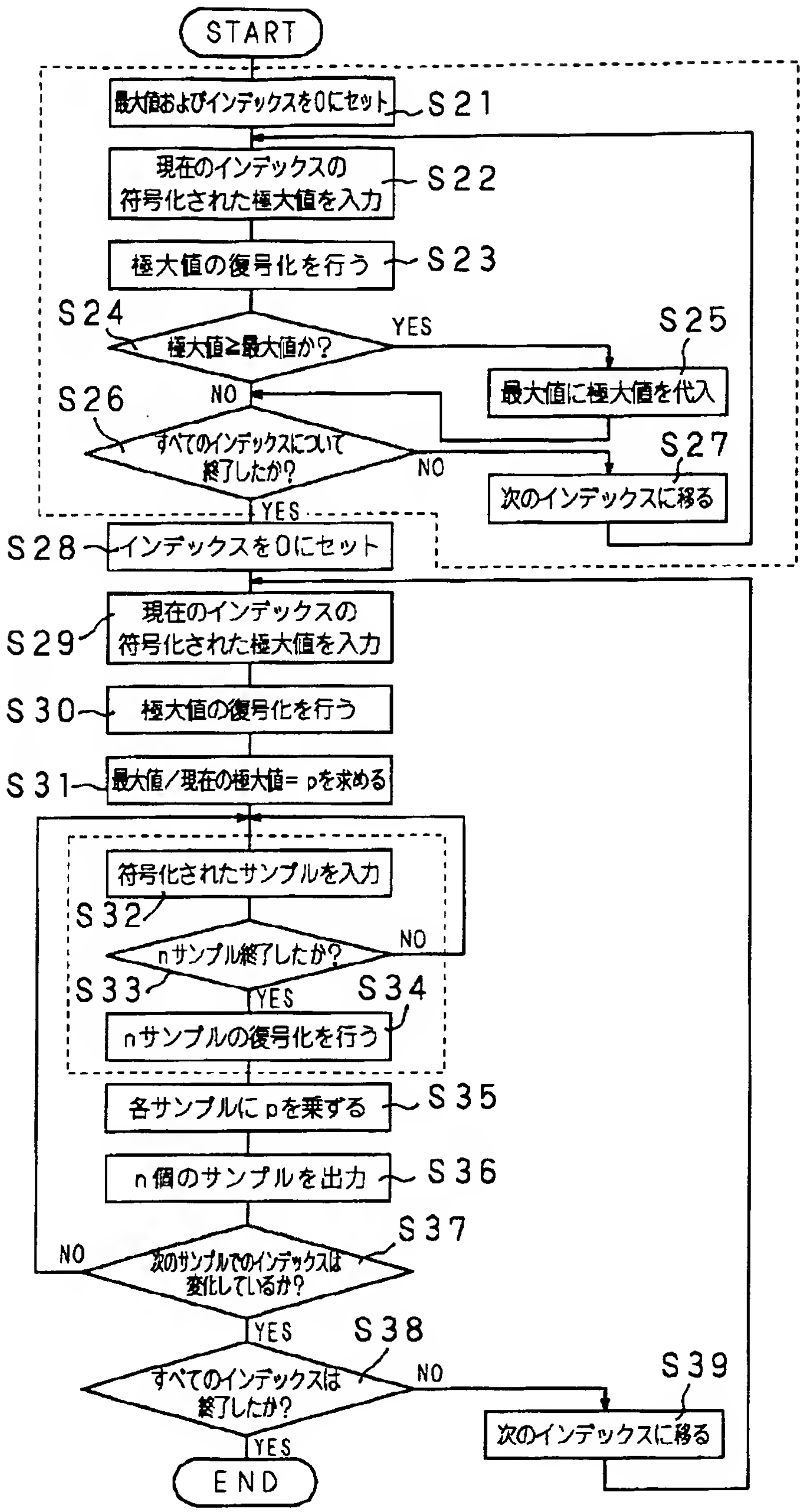
[Drawing 2]



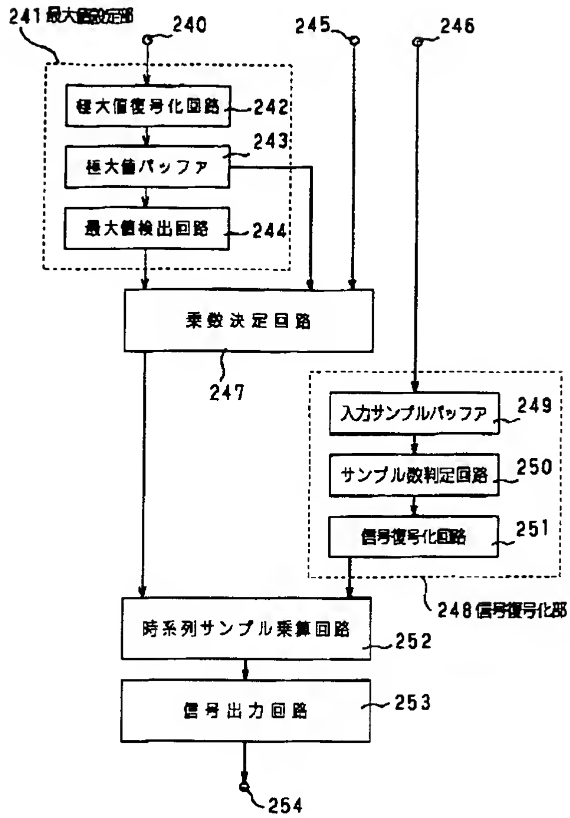
[Drawing 6]



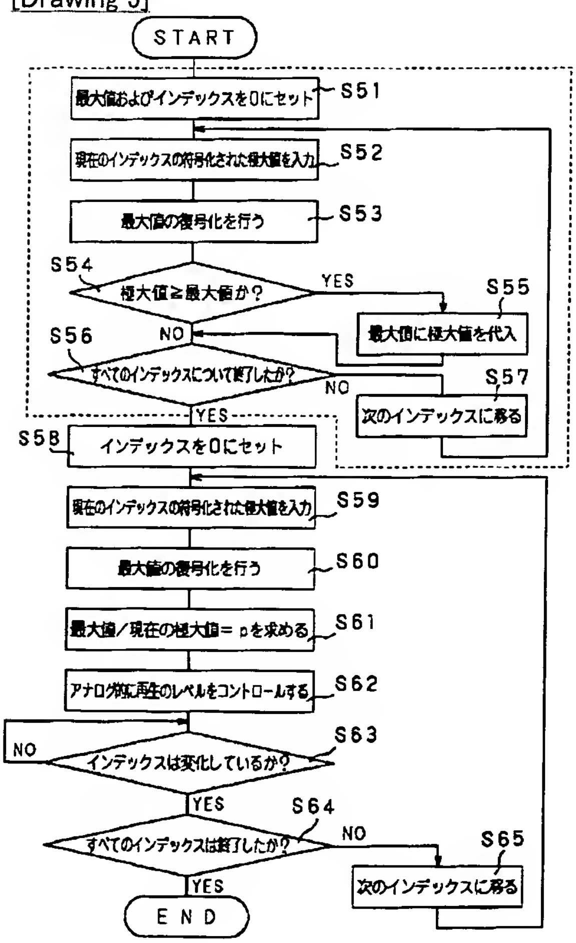
[Drawing 3]


START
最大値およびインデックスを0にセット
S21
現在のインデックスの
符号化された極大値を入力
S22
極大値の復号化を行う
S23
S24
極大値≧最大値か?
YES
S25
最大値に極大値を代入
NO
S26
すべてのインデックスについて
終了したか?
NO
S27
次のインデックスに移る
YES
S28
インデックスを0にセット
現在のインデックスの
符号化された極大値を入力
S29
S30
極大値の復号化を行う
S31
最大値/現在の極大値=pを求める
符号化されたサンプルを入力
S32
nサンプル終了したか?
NO
S33
YES
S34
nサンプルの復号化を行う
各サンプルにpを乗ずる
S35
n個のサンプルを出力
S36
S37
NO
次のサンプルでのインデックスは
変化しているか?
YES
S38
すべてのインデックスは
終了したか?
NO
S39
次のインデックスに移る
YES
END

[Drawing 4]


241 最大値設定部
240
245
246
極大値復号化回路
242
243
極大値バッファ
最大値検出回路
244
乗数決定回路
247
入力サンプルバッファ
249
サンプル数判定回路
250
信号復号化回路
251
248 信号復号化部
時系列サンプル乗算回路
252
信号出力回路
253
254

[Drawing 5]


START
最大値およびインデックスを0にセット
S51
現在のインデックスの符号化された極大値を入力
S52
最大値の復号化を行う
S53
S54
極大値≧最大値か？
YES
S55
最大値に極大値を代入
S56
NO
すべてのインデックスについて終了したか？
NO
S57
次のインデックスに移る
YES
S58
インデックスを0にセット
現在のインデックスの符号化された極大値を入力
S59
最大値の復号化を行う
S60
最大値／現在の極大値＝ｐを求める
S61
アナログ的に再生のレベルをコントロールする
S62
NO
インデックスは変化しているか？
S63
YES
S64
すべてのインデックスは終了したか？
NO
S65
次のインデックスに移る
YES
END